Experimental Studies on Social Behavior of Entrepreneurs

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Abstract

How do entrepreneurs' social inclinations compare to those of non-entrepreneurs? Does the social preference structure of entrepreneurs provide us with information regarding the business type they choose to operate (i.e., whether they choose to run a social business versus a commercial business)? Do social preferences relate to (un)productive entrepreneurial motives? Does personality play a role in this context? This dissertation addresses these research questions by conducting four experimental studies with actual entrepreneurs, business and economics students, farmers, and start-up employees, collaborators and investors. Thereby, different methods are applied in laboratory, online, and lab-in-the-field experiments. The findings suggest entrepreneurs to hold generally stronger social tendencies, in particular in relation to cooperation. No link between social preferences and the choice of founding a social or commercial business is found.

Zusammenfassung

Unterscheidet sich die Ausprägung sozialer Präferenzen zwischen Unternehmern und Nicht-Unternehmern? Beeinflussen die sozialen Präferenzen von Unternehmern welchen Geschäftstyp (soziales vs. kommerzielles Unternehmen) sie gründen? Haben soziale Präferenzen einen Einfluss auf produktive und/oder unproduktive unternehmerische Motive? Spielt die Persönlichkeitsstruktur in diesem Kontext eine Rolle? Die vorliegende Dissertation behandelt diese Fragen anhand von vier experimentellen Studien mit Unternehmern, Landwirten, Studierenden der Betriebs- und Volkswirtschaftslehre, sowie Mitarbeitern, Kollaboratoren und Investoren von Start-up-Unternehmen. Dabei werden unterschiedliche Methoden in Labor, Online, sowie „Lab-in-the field“ Experimenten angewendet. Die Ergebnisse zeigen, dass Unternehmer im Vergleich zu den anderen Testgruppen, generell stärker ausgeprägte soziale Präferenzen besitzen, insbesondere bezüglich kooperativer Eigenschaften. Darüber hinaus wird kein Zusammenhang zwischen den sozialen Präferenzen von Unternehmern und ihrer Entscheidung ein soziales oder kommerzielles Unternehmen zu gründen gefunden.

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Table of Contents

List of Tables

List of Figures

List of Graphs

List of Appendix Figures

List of Appendix Tables

List of Appendix Graphs

Abbreviations

BIG 5	Big Five Personality Traits/Five-Factor Model
BT	Business Talent
CSR	Corporate Social Responsibility
CT	Creative Talent
DG1	First dictator game played
DG2	Second dictator game played
ECFI	European Conference on the Future Internet
ECI	(start-up) employees, collaborators and investors
E	Entrepreneur
EI	Entrepreneurial Intentions
EUT	Expected Utility Theory
HEXACO	Model of Personality Structure (6 Dimensions)
MACH	Machiavellianism
MachIV	Machiavellianism Personality Test (Christie and Geis, 1970)
NGO	Non-Governmental Organization
NPI	Narcissistic Personality Inventory
NPI 16	A short measure of the NPI (see above)
OLS	Ordinary least squares
ORP	Other regarding preferences
ORSEE	Online Recruitment System for Economic Experiments
PSPS	Perfectionistic Self-Presentation Scale
S	Student
SEV	Social Entrepreneurial Ventures
SD3	Short Dark Triad Scale
SOEP	Socioeconomic Panel
SPSS	Statistical Package for the Social Sciences
SME	Small and Medium Sized Enterprises
SRP-III	Self Report Psychopathy Scale
SuP	Start-up Professionals
TOA	Tech Open Air

1. Introduction

How do entrepreneurs' social dispositions compare to those of non-entrepreneurs? Does the social preference structure of entrepreneurs provide us with information regarding the business type they choose to operate (i.e., whether they choose to run a social business versus a commercial business)? Do social preferences relate to (un)productive entrepreneurial motives? Does personality play a role in this context?

In the following, I will outline the research questions of my dissertation and the underlying motivations for addressing these questions. As the articles are interconnected, I will in some detail outline their relationships to each other and the motivations they share, while also summarizing the main contributions of the articles.

1.1. Motivation

The study of entrepreneurial decision-making has made considerable advances over the last decades, and has thus provided entrepreneurial researchers, practitioners, as well as policy makers with valuable insights. Researchers have for example analyzed how entrepreneurs' choices differ to those of non-entrepreneurs (e.g., Busenitz and Barney, 1997; Mitchell et al., 2002; Burmeister and Schade, 2007; Schade and Köllinger, 2007), how they exploit business opportunities (e.g., Shepherd, Patzelt, Baron, 2013), and make exit decisions (e.g., Sandri et al., 2010; Wennberg and DeTienne, 2014). Other studies have focused on investigating individual differences of entrepreneurs based on the role of personality (Rauch and Frese, 2007; Brandstätter, 2011), cognition (Mitchell et al., 2002), and emotions (Klaukien et al., 2013).

I argue that an important aspect within this field of research is presented by studying entrepreneurs' social preferences and social tendencies. In the following, I present three different motivations for studying the social preferences of entrepreneurs:

(1) The entrepreneurial environment is unique, characterized by considerable uncertainty (Knight, 1921), high asset specificity (Williamson, 1995), and by a

generally complex, very fast and innovative nature (Schumpeter, 1987). Dispositions of social preferences could play an important role as to how entrepreneurs deal with the challenges of the entrepreneurial environment. For example, social or other regarding preferences might affect entrepreneurs' relationships with capital providers and/or other important stakeholders (Cable and Shane, 1997). Being able to establish and maintain cooperative, long-term, and trusting relationships could offer entrepreneurs an element of risk reduction, thus providing a potential comparative advantage. Also, past studies have exposed a positive link between pro-sociality and certain business-related factors, such as earnings (Bowles et al., 2001) and productivity (Barr and Serneels, 2009; Carpenter and Seki, 2011), which hold also outside the laboratory (lab-in-the-field experiments). For example, Leibbrandt (2012) shows that sellers, who act more pro-social in laboratory experiments, realize higher returns for their products than their more selfish counterparts. It hence appears that pro-social preferences positively impact certain business performance measures. Thereby, different suggestions regarding the mechanism by which this occurs have been offered. One suggestion is that individuals with more pronounced social preferences are less inclined to behave opportunistically, for example with their stakeholders, and consequently realize reputational benefits (Bowles et al., 2001). Others suggest that pro-social individuals are generally better at interacting and can consequently more strongly benefit from certain network effects (Barr and Serneels, 2009).

(2) However, the aforementioned characteristics of the entrepreneurial environment also open up possibilities for unproductive rent seeking and destructive venturing (Baumol, 1990). Given the ever-increasing environmental as well as social issues on our planet, its limited natural resources in combination with an increasing world population, and soaring wealth inequality problems (Zucman, 2019), the way entrepreneurs act with regards to these aspects determines to a large extent how our future business, but also societal, and environmental landscapes will look like. I believe entrepreneurs, with their creative and innovative decision-making, play a crucial role for the implementations towards a more sustainable paradigm shift. Markman et al. (2016) proclaim how, given the severity of our ecological issues, it is not sufficient anymore to merely *balance* the triple bottom line of corporate social responsibility (CSR). The authors propose that in order to be a

sustainable and ethical entrepreneurial enterprise, ventures need to balance environmental goals *first*, followed by societal goals and *lastly* focus on economic goals. Yet, the Global Entrepreneurship Report of 2019/20 reports that the main motivation for starting up a new venture is still predominantly driven by economic concerns (i.e., "to build great wealth or high income") (Bosma et al., 2020). The balancing of entrepreneurs' business goals (i.e., monetary vs. ecological and sustainable goals) will in particular be addressed in Article 1 and Article 2 of this dissertation, in which conjoint experiments are conducted with farmers (Article 1) and other entrepreneurs (Article 2). These studies offer us a better understanding as to how certain trade-offs are made on these domains (i.e., profit vs. ecological aspects) and consider potential implications.

Ostrom (2010) discusses how many of our current environmental issues resemble the situation of a social dilemma. Findings of studies investigating this link in more detail, suggest social preferences to indeed play a role in the conservation/exploitation of resources. Fehr and Leibbrandt (2011) for example study how other-regarding preferences affect the exploitation of common pool resources. The authors find fishermen, who demonstrate stronger cooperative tendencies in the laboratory (measured via a public good game) to be less likely to exploit their fishing grounds (Fehr and Leibbrandt, 2011). Riedl and Smeets (2017) find social preferences to have a significantly positive impact on socially responsible investment decisions, even if that decision leads to lower financial returns. Knez (2016) reports altruistic individuals to show a greater willingness to make sacrifices in order to protect the environment. Hence, social preferences appear to play a determinant role for responsible and sustainable economic decision-making. In Article 3 and Article 4 of this dissertation, other-regarding preferences (of actual entrepreneurs, economics and business students, as well as start-up employees, collaborators and investors (ECI)) are elicited via incentive compatible methods, making partial use of the same dataset. The focus is thereby on the preferences of altruism and (strategic) cooperation. Implications of the results are discussed, in relation to the motivation of this paragraph as well as the previous one (i.e., discussing the link between pro-sociality and business-related factors).

(3) Some of the aspects raised in the second motivation (2) have been addressed by the *social entrepreneurship* literature. Social entrepreneurship has, given the dire environmental and wealth equality situation on our planet, received accelerated attention in the past two decades. Thereby, there is still no agreed upon definition as to what social entrepreneurship really means or entails (Mair and Marti, 2006; Choi and Majumdar, 2014, Saebi et al., 2019). Understanding how social and ecological preferences are related to the concept of social entrepreneurship (or not) should thereby offer valuable insights. This aspect is addressed in particular in Article 2 and Article 3 of this dissertation. The data collected in these two independent experimental studies allows us to investigate whether pro-social attitudes systematically differ between social and commercial entrepreneurs.

While pro-sociality has been considered in a range of labor economic contexts (see e.g., Charness and Villeval, 2009; Fehr and Leibbrandt, 2011; Gneezy et al., 2016), there is surprisingly little empirical research investigating social preferences in the context of entrepreneurship. Notable exceptions present the studies by Weitzel et al. (2010) and Urbig et al. (2012), whose designs are partially replicated in Article 3 and Article 4.

Based on the uncertainty prevailing in entrepreneurial environments, social norms are likely to play a central role in this field of work (see e.g., Meek et al., 2010). Social norms present "normative standards of behavior that are enforced by informal social sanctions" (Fehr and Fischbacher, 2004, p.63). Ultimately, social norms can cause a lasting change in an individual's motivation to act pro-social or not (Fehr and Gächter, 2002), making entrepreneurship a particularly interesting field of application for the study of social dispositions.

1.1.1. Overview, core results, and contributions: Article 2

Article 2 ("Do social entrepreneurs operate social businesses?) contributes to the (social) entrepreneurship literature by experimentally investigating preference structures of actual entrepreneurs using conjoint analysis. The entrepreneurship literature, when distinguishing between social and commercial entrepreneurs, does so mainly on the basis of the company's mission, also termed the *mission-based approach* (i.e., Dees, 1998;

Bacq and Janssen, 2011). Thereby, if the mission of a business follows a social objective, the founder is consequently classified as a *social entrepreneur*. In Article 2, this perspective is shifted and a new criterion of distinction is introduced, namely the entrepreneur's *weighing of the attributes* as described by the triple bottom line (Elkington, 1998). A social entrepreneur in Article 2 is consequently characterized by a stronger weighing of environmental and social attributes relative to economic ones. Analogously, a commercial entrepreneur is characterized by strong monetary preferences in relation to environmental and social ones. The article's definition of a social entrepreneur is thereby completely independent of the venture's pursued mission. This means, based on the definition, also the founder of a business with a *commercial mission*, can be defined as a *social entrepreneur* - if his operational preferences are dominated by ecological and social concerns, rather than monetary ones. This new approach offers some valuable insights towards the discussion as to what in today's society constitutes social and sustainable entrepreneurship; and whether exclusively defining social entrepreneurship based on the venture's mission or profit structure offers the most informative concept or definition. Article 2 experimentally analyzes this research question by running a conjoint experiment with N=45 entrepreneurs, who run either *commercial* or *social businesses*: In our experimental design, the *type of business* the entrepreneur operates is thereby strictly defined by the *venture's mission.* This allows us to investigate whether *social/commercial businesses* are exclusively operated by *social/commercial entrepreneurs,* or whether there is a mixture across these two domains.

Interestingly, results show that social and commercial business owners do not differ systematically in their preference structures (a finding confirmed in Article 3). Via cluster analysis two types of entrepreneurs are identified: one type is thereby characterized by strong monetary preferences, the other by strong social and ecological preferences, in line with the article's definition of a social entrepreneur. In each cluster type social as well as commercial business owners are observed.

This implies that social business owners do not necessarily prefer social and ecological outcomes to monetary ones. And not all commercial business owners are predominantly driven by monetary preferences.

Since social business owners do not differ in their preferences to commercial business owners, there must be other reasons why they choose to operate such a business. Researchers suggest that there might be a "warm glow" they receive in their work, for example, in the form of recognition by others (Baron, 2007). Therefore, it is tested whether the perception of their responsible behavior is more important for social than for commercial business owners. The results do not support this hypothesis.

The findings consequently raise the question, whether the theoretical definitions of *social entrepreneurship* in the literature offer the best understandings as to what this type of entrepreneurship entails, and what not. It is argued that the mission-based approach fails to account for the way the venture is *operated* (*how* that mission is pursued), while the article's findings suggest that this aspect plays an integral part in the discussion. Given our global environmental and societal problems, it is proposed that the aspect of *"how"* should not be ignored when defining the concept of social entrepreneurship. Rather, in line with the argument by Markman et al. (2016), it should comprise a central aspect within this discussion.

1.1.2. Overview, core results, and contributions: Article 1

Article 1 of my dissertation uses the same methodology as Article 2, namely conjoint analysis. However, for this article the experiment was not conducted online but via a mobile laboratory. While still focusing on entrepreneurs as subjects, exclusively farmers were recruited and their trade-off decisions analyzed, for example in relation to economic and ecological aspects. The chosen subject pool offers important insights in particular in relation to the second motivation for studying entrepreneurs' preferences (namely understanding the potential for unproductive rent seeking and destructive venturing).

Farmers have become increasingly under pressure by society, as well as by the government, to run their farms in an ecological and sustainable way. Industrial farming is still on the rise, despite its potential negative effects on consumer health, food safety, sustainability of the ecosystem (e.g., fertility of the soil), and community well-being (Schlosser, 2001; Lyson et al., 2004; Labao and Stofferahn, 2008). Farming operations are highly dependent on political implications, as subsidies and legal requirements to a

large extent determine their decision-making (e.g., Guyomard et al., 1996; Hennessy, 1998; Sckokai and Moro, 2009). This makes farmers a particular interesting subject pool, as it allows us to investigate what is, at least to some extent, driving the current structural change of agriculture – i.e., are farmers' preferences strictly dominated by profit maximizing considerations and/or a disregard for the fertility and sustainability of their soil? Should this not be the case, then other reasons need to be considered as to why we observe this structural trend. Do governmental policies lead agriculture into the right direction? Are farmers acting in line with their preferences when operating their farms?

This paper sheds some light onto the preferences of farmers, providing also valuable information for a refined discussion regarding the structural trends currently observed within agriculture, and which policies based on these findings could be most effective.

The findings show most farmers to consider the long-term goal of "maintaining the fertility of the land" as the most important goal, more important than income and risk. Preferences are heterogeneous. Three distinct clusters are identified. One of those, for instance, is quite concerned with the impact of farming on the environment, while another cluster is characterized by a much stronger tendency towards short-term, monetary and selfish goals.

The results of this study are also valuable from another important perspective: They show that not only consumers, but also producers are better understood when taking into account utility dimensions beyond those of profit maximization.

1.1.3. Overview, core results, and contributions: Article 3

Article 3 ("Cooperation and altruism in incentive compatible experiments with entrepreneurs, professionals, and business students") contributes to the academic and applied field of entrepreneurship by empirically investigating sharing (altruistic) and cooperating tendencies of actual entrepreneurs using game theoretic concepts. Entrepreneurs' game behavior is experimentally analyzed using a standard dictator game (Kahneman et al., 1986; Forsythe et al., 1994) as well as an iterated two player public good game (Ledyard, 1995). Entrepreneurs' behavior is compared to that of business and economic students, as well as start-up employees, collaborators and investors (ECI).

Comparing the behaviors of these three groups allows for testing the results' generalizability.

Results show entrepreneurs to be indeed more willing to share in the dictator game, in particular in comparison to the business and economic students. They also exhibit, in relation to economic and business students and start-up ECIs, a significantly higher willingness to cooperate in the public good game.

This finding is independent of social entrepreneurship, i.e., entrepreneurs who run a more social business do not behave significantly differently in the games' allocation choices. This finding is in line with the results of Article 2, which found social and commercial business owners to not systematically differ in their preference structures.

Article 3 further investigates the role of beliefs regarding one's own *entrepreneurial talent (self-efficacy)* onto game behavior. Following the approach by Weitzel et al. (2010) and Urbig et al. (2012), principal factor analysis is applied to separate the variable further into *business* and *creative talent.* Depending on game type and sample group different influences of these two variables onto pro-social behaviors are observed.

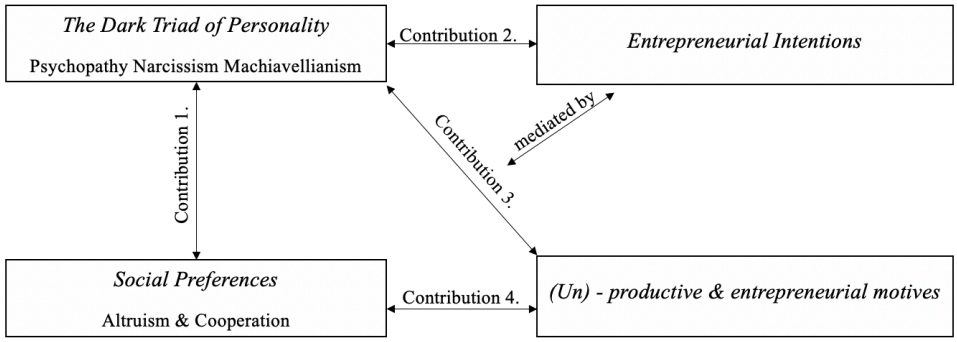
For the sample of entrepreneurs, we find business talent to negatively influence allocation choices in the dictator game, while creative talent bears a marginally positive impact in this context. In the cooperation game, we find entrepreneurs to not be significantly influenced by either of these self-assessed variables. However, start-up employees, investors and collaborators display a significantly negative association between business talent and distributive choices in the public good game.

1.1.4. Overview, core results, and contributions: Article 4

Article 4 ("The dark triad and its relations to social preferences and (un)productive motives in an entrepreneurial context") makes partial use of the data analyzed in Article 3. The article offers four different contributions (see Figure 1 below for an overview of contributions and associations). Some of them build on previous contributions of this dissertation, by utilizing different approaches or new methods. For example, in previous

articles it was discussed how social preferences of entrepreneurs might manifest into their entrepreneurial decision-making process. This article investigates *productive* (i.e., is the motivation to start a business characterized by "developing a culture in which its employees value their work"*)* and *unproductive entrepreneurial motives* (i.e. "achieving financial success, even if it is a little destructive to society") (Hmieleski and Lerner, 2016) and analyzes if and how these motives are related to the *social preferences* of cooperation and altruism (see contribution 4 in Figure 1). Understanding this link, or the lack thereof, certainly enriches our understanding and discussion of the context of entrepreneurial social preferences.

Figure 1: Summary of contributions for Article 4



Other contributions of this article consist in the analysis of relationships between *personality traits* and (i) *social preferences* (contribution 1, in Figure 1)*,* (ii) *entrepreneurial intentions* (contribution 2)*,* and (iii) *(un)productive entrepreneurial motives* (contribution 3).

The article discusses in detail, in particular for an *entrepreneurial context*, the value of understanding whether *dark personality traits* are really more prominent in individuals intending to start an entrepreneurial venture, as has been suggested in the entrepreneurship literature (e.g., Miller 2014; Akhtar et al., 2013; Wales et al., 2013; Mathieu and St. Jean, 2013).

Starting with the findings in relation to the first contribution, a *rather weak relationship between dark personality traits and the social preferences of altruism and cooperation is found*. In relation to the second contribution, *the results indicate potential future entrepreneurs to be less likely to hold psychopathic tendencies and to be no more,*

but also no less, inclined to hold narcissistic tendencies than other individuals. This finding is in particular relevant for the direct stakeholders of the entrepreneurial firm, such as its employees, suppliers, and venture capitalists (or other credit providers), as they do *not* have to manage these personalities in order to secure their own (financial) well-being. Moving to the third contribution of the paper, *the data shows a significant positive relationship between unproductive entrepreneurial motives and the dark traits of narcissism as well as psychopathy.* These findings, in combination with those in relation to entrepreneurial intentions and the dark triad, suggest *individuals with higher entrepreneurial intentions to not be characterized by personality traits, which can be systematically linked to unproductive entrepreneurial motives.*

1.2. Conclusion

This dissertation explores in four different experimental studies social preferences of commercial and social entrepreneurs, start-up employees, collaborators, and investors, as well as business and economic students. The core results suggest social preferences to not systematically differ between commercial and social business owners. Comparing the social preferences of entrepreneurs and non-entrepreneurs, the data indicates entrepreneurs to generally exhibit stronger social inclinations, this holds in particular in the context of cooperation. Future research should investigate in more detail, how social preferences transform into entrepreneurs' daily, i.e., operational decision-making. While the results suggest that certain socially undesirable personality traits can systematically be linked to unproductive entrepreneurial motives, the data shows individuals with high entrepreneurial intentions to not be characterized by these personality traits. This means, ceteris paribus, that for the likelihood of making social and sustainable decisions, better conditions in terms of personality structure are found for individuals displaying high entrepreneurial intentions

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2. ESSAY NO. I

It's not only money that makes their world go round: Results of a conjoint analysis on the utility dimensions of farmers[1]

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This paper extends the previous multidimensional preference literature from the consumer's to the producer's point of view using the context of farming. We apply conjoint analysis to test farmers' preferences regarding four different attributes. Two: profit and risk, are reflecting short-term monetary and self-regarding aspects, two: long-term fertility of the land and environmental externalities, are representing other-regarding as well as long-term goals. N=68 respondents, 49 agricultural students and 19 farmers from Germany were confronted with eight different farming situations, which were constructed using the aforementioned attributes. Subjects had to rank these situations according to their preference on how to ideally operate a farm. We find most farmers to consider the long-term goal of "maintaining the fertility of the land" as the most important goal, more important than income and risk. Preferences are heterogeneous, and we are able to identify three distinct clusters. One of those, for instance, is quite concerned with the impact of farming on the environment. Our findings are important since they show that not only consumers, but also producers might better be described when taking into account utility dimensions beyond profit maximization. We discuss explanations and extensions of our thoughts, i.e., cluster membership might be related to theories on motivation crowding, and gender differences turn out to be important to better understand environmental concerns.

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2.1. Introduction

Standard economic theory has a tendency to ignore the influence of an agent's norms, values and multidimensional preferences on decisions. For the most part, this negligence is caused by the seemingly persistent argumentation that the maximization of profits (or at least some uni-dimensional utility) is the main – if not sole – driver of economic decisions. However, this view has been progressively criticized, as it fails to explain real-life behavior. For example, the fact that individuals donate money, or display other altruistic motives, demonstrates that other preferences, besides selfish monetary ones, must play a role for decision-making. The field of behavioral economics addresses these inconsistencies found between standard economic theory and actual behavior. Game theoretic experiments, i.e., those employing dictatorship and ultimatum games, have shown that the game theoretic solution, a prediction based on standard economic theory, is generally not supported: In the dictatorship game, the majority of proposers allocates some portion of their monetary endowment to the recipient, who has no decision to make but can only accept the proposal (consequently there is no strategic or risk component in this game, making it more of an allocation task than a game). Concepts used to explain this or similar behaviors have been the notions of fairness and reciprocity in the ultimatum game (e.g., Güth et al., 1982; Bolton and Ockenfels, 2000), and altruism or inequity aversion in the dictatorship game (e.g., Kahneman et al., 1986; Rabin, 1993; Fehr and Schmidt, 1999).

While the results of various studies, applying all kinds of different treatments (i.e., changing the context, playing one-shot vs. multiple rounds, anonymity of dictator etc.), have produced valuable insights, the trade-offs subjects had to face in these experiments are essentially always based on the notion of a two-dimensional preference: the allocation of money to the decision-maker (i.e., selfish preference) versus the allocation of money to someone else (i.e., fairness, altruistic, reciprocal or inequity-averse motives). We would like to extend this line of research as in real-life situations individual's decisions are often based on the trade-offs between multiple preference (i.e., greater than two) dimensions. Krantz and Kunreuther (2007) describe, for example, the multiple goals individuals consider when making decisions on insurance and other protective measures, in particular focusing on the impact of financial and emotional goals.

Within the field of consumer (marketing) research the quantitative modeling of multi-dimensional preferences is common. Thereby, in particular the method of conjoint analysis (Green and Rao, 1971) has found widespread application. This technique faces the subject with a number of stimuli, defined by a selection of attributes which can take on different levels. The subject's ranking of the proposed stimuli statistically allows for deriving the individual's preference order of the presented attributes. In recent times however, this method has found application in various new and different contexts, including the context of environmental concerns. These studies aim at measuring the public's preferences for environmental goods, i.e., landscape, surface and water quality (Alriksson and Öberg, 2008). Columbo et al. (2006), for example, analyzed the social benefits of soil conservation and found the public to be placing a higher value on water quality and landscape benefits than on wildlife and employment benefits. However, generally the adoption of multidimensional modeling via the method of conjoint analysis is rare outside consumer research. In particular for choices related to production decisions this approach has been neglected.[2] It is likely that this is due to the fact that especially producers' decisions are assumed (by economists) to be derived from purely selfish and monetary goals (i.e., profit maximization).

Our study contributes to the scarce knowledge of producers' multidimensional preferences. We run an experiment, employing the method of conjoint analysis, with N=68 farmers and agricultural science students. This subject pool and area of application was chosen, as there is ample evidence that farmers' production decisions are particularly heterogeneous, based on the multiple and often conflicting goals farmers have to manage (Gasson, 1973; Fairweather and Keating, 1994). To the best of our knowledge, there is only one other study that concerns itself with a similar context and method. Bond et al. (2011) analyze the extent of environmental considerations of Colorado corn producers in their farm management decisions, by asking subjects to trade-off between irrigation systems with different profit, risk, nitrate leaching and soil erosion levels. Via panel mixed logit estimation techniques, the authors find a willingness to reduce soil erosion and nitrate leaching and, as a consequence, accept irrigation systems associated with lower profit and higher risk levels. Our study in some critical points differs from the

[2] Interesting research via conjoint analysis on financing decisions in the field of entrepreneurship has been conducted by Shepherd and Zacharakis (1999) and Franke et al. (2006).

aforementioned research: While Bond et al. (2011) employ exclusively corn producers from Colorado, our study does not limit itself to a particular style of farming or location, which should increase the generalizability of our study, especially as the chosen attributes, which the subjects had to base their trade-offs on, did not refer to any particular farming style but were kept as general as possible. A further noteworthy methodological difference in the experimental design is that the subjects in the study by Bond et al. (2011) had to make their decisions relative to their current farming situation, whereas our study constructed agricultural situations which were framed neutrally and entirely independent of the farmers' current situation. We believe a neutral and generally independent framing avoids the potential risk of cognitive biases when deciding on the trade-offs of the attributes, in particular the status-quo bias (Samelson and Zeckhauser, 1988; Burmeister and Schade, 2007), and hence leads to more reliant findings on the relative importance of the attributes.

Although the data used by Bond et al. (2011) was originally collected via the method of conjoint analysis in 1997 (Page, 1997), the authors in their paper use panel mixed logit estimations (and other fixed parameter specifications) to derive their results. Our data was collected in the winter period of 2012 and 2013 in Germany and was analyzed by the standard conjoint method. Our study further uses the conjoint results to cluster farmers into three distinguished groups, which allows us to further analyze their heterogeneity.

The implications of the resulting cluster formations, in particular for agricultural policy, are also discussed against the background of motivation crowding theory (Frey, 1997), which posits that the introduction of monetary incentives may partially or even entirely undermine voluntary contribution, leading to (at least partially) undesirable effects (Frey and Jegen, 2001; Gneezy, 2003). Finally, this paper examines the role of gender differences for other regarding preferences (ORP), as past experimental research has indicated, despite some contradictory results, females to be exhibiting stronger altruistic preferences (or ORP in general).

We find that for most farmers, keeping their land fertile gets the strongest part-worth utility, whereas monetary aspects such as profit and volatility of profit are somewhat less important. Many farmers also care for externalities, i.e., for the environmental impact of their farm. Those preference orderings turn out to be largely dependent on cluster

membership. In one of the clusters, the monetary values are very important, in another, environmental concerns are.

The remainder of this paper is organized as follows. Section 2 provides a review on the existing literature regarding multidimensional preferences of farmers, motivation crowding, and gender effects in the domain of altruism/other-regarding preferences, as well as the theoretical background for the applied method of conjoint analysis. Section 3 outlines the experimental design. Section 4 describes the process of sample collection and the generated data. Section 5 presents the study's findings. Section 6 contains a discussion, section 7 concerns itself with potential limitations of the study and concludes.

2.2. Theoretical Background

2.2.1. Multiple preferences of entrepreneurs

Farmers were chosen as subjects of this study as past studies have shown that this occupational group, for several reasons, appears to be ideally suited for its objectives. One of the reasons is that farmers, who operate in very homogenous conditions, display heterogeneous characteristics in regards to their farming operations (Gómez-Limón and Riesgo, 2004). Findings like this support the criticism of the standard economic assumption, and demonstrate that farmers' production decisions cannot be solely based on profit maximizing motives or any other one-dimensional utility function as otherwise homogeneous operations should be observed in homogeneous environments (see also Gasson, 1973; Ilbery, 1983; Dent, Edwards-Jones and McGregor, 1995; Austin et al., 1996 on a detailed discussion of the insufficiency of predicting farmers decision-making/ behavior based on any uni-dimensional criterion). Based on these results, it appears plausible why the few studies employing a conjoint analysis to analyze producers' multiple preferences have focused on the agricultural industry.

Indeed, farmers have been shown to be motivated by multiple and often conflicting goals or objectives (Fairweather and Keating, 1994), which essentially influences how farmers arrive at their decisions regarding the allocation of resources as well as their operation style. This conflict is certainly also based on the fact that many farms comprise family businesses, which have to balance lifestyle choices with management choices, so that these two objectives are expected to be highly interrelated and contradictory (Gasson,

1973; Willock et al, 1999). Past literature has generally categorized farmers' goals and values as being either economic, conservation, and/or lifestyle based (Austin et al., 1996; Beus and Dunlap, 1990; Petzelka et al., 1996; Maybery et al., 2005). While farmers with a strong emphasis on economic values prioritize capital returns, farmers with strong values in the domain of conservation reveal higher considerations for environmental issues and nature conservation (Maybery et al, 2005). Farmers exhibiting strong environmental values, for example, should place more emphasis on the impact that their farming style has on the environment and, based on their evaluation, might decide for a farming practice that has a low environmental impact but also potentially generates less profit.

Based on previous literature and a number of thorough qualitative interviews regarding farmers' values and goals, which were carried out by one of the authors of this article in the North-German region Angeln in preparation for this study[3], we identified the following four attributes as most relevant for our study: (1) average level of income, (2) volatility surrounding that average, (3) concern of the farmer for her environment (externalities), and (4) the concern of the famer for the long-term fertility of the land (long-term goals).

2.2.2. Motivation crowding theory

As the aim of this paper is to unravel the importance of certain preference dimensions of farmers, a somewhat natural and important extension of this research is to develop some kind of policy recommendations based on the generated findings, so that in particular environmentally sound practices (often the key aim of agricultural policies) are adopted successfully. We believe that motivation crowding theory (Frey 1997; Frey and Oberholzer-Gee, 1997; Frey and Jegen, 2001) plays a critical role within this context. While we cannot explicitly test for this theory within our experimental design, we consider it an essential aspect for the interpretation of the results and consequent policy recommendations and hence outline the theoretical background here in more detail. The theory posits that by offering an intrinsically motivated individual (where the motive to perform a certain action arises from within the person (Frey and Jegen, 2001)) monetary

[3] The master thesis and the full transcripts of the respective interviews are available from the authors upon request.

or other external incentives, in order to increase or maintain the supply of some desirable action, could actually lead to decreasing supply levels. A classic example of this phenomenon is by Titmuss (1970), who argued that monetary compensation for donating blood might crowd out the supply of blood donors. Such a reaction is contrary to the one predicted under standard economic assumptions, such as in principal-agent theory, where monetary compensation for certain levels of performance is always expected to lead to an increase in the desired action (e.g., Fama and Jensen, 1983). Standard economic theory however completely ignores the different possible sources of motivation (i.e., extrinsic and intrinsic motivation) and the potential consequences but only focuses on the relative price effect. In motivation crowding theory, the introduction of monetary incentives can lead to different results, depending on the way internal and external motivation may interact (Frey and Jegen, 2001). If external intervention does not affect intrinsic motivation, or if external intervention even increases intrinsic motivation (*"crowding-in effect"*), then monetary incentives will definitely increase the supply of some action (raise performance). However, should the external intervention impair the intrinsic motivation then the opposite may result, namely that supply will decrease (*"crowding-out effect"*). As Frey and Jegen (2001, p.593) point out:

"In general, both the relative price effect and the crowding-out effect are active, so that external intervention has two opposite effects on the agent's performance. Whether intervening is beneficial from the principal's point of view depends on the relative size of the two countervailing effects."

For this research, it would be particularly interesting to recognize those farmers who are intrinsically motivated to minimize the environmental externalities that are caused by their farming style and to be able to distinguish these from farmers who would care to adopt such a low impact farming style only when monetarily incentivized to do so (who are considered to be extrinsically motivated). While it might be difficult to determine whether a farmer is extrinsically or intrinsically motivated to engage in environmentally friendly farming operations (in particular when some environmental factors are not completely independent from monetary considerations), by being able to observe how farmers trade-off certain attributes (i.e.., profit vs. externality) one should be able to derive indications regarding the farmer's source of motivation. We suggest that a person who demonstrates a high level of priority (and thus a higher level of utility) for

certain non-monetary actions - like a high concern for externalities in combination with a low level of priority for monetarily linked actions, such as profits, can be assumed to be intrinsically motivated. On the other hand, a person who derives a high utility from profits or similar is easier to be motivated to perform certain non-monetary actions when she will be compensated with monetary incentives for doing so. Consequently, depending on the motivation sources of the farmer and the effect external incentives have on those, external interventions, such as agricultural policy, which might introduce, e.g., positive monetary rewards for performing certain environmental practices, may actually crowd out the intrinsic motivation of certain farmers leading to an unsuccessful policy adoption (at least partially).

2.2.3. Other-regarding preferences and gender effects

Two of our chosen attributes (the attributes will be described in more detail in the next section), namely the concern of the farmer for her environment ("externalities"), and the concern for the long-term fertility of her land ("fertility"), present other-regarding and/or long-term preferences. With respect to the other-regarding aspects of those attributes (externalities affecting nature and others; ruining the fertility of the land affecting future generations), gender might play a decisive role, as past experimental research has shown that males and females exhibit significant differences in their social or other-regarding preferences (ORP). While the results of these studies are somewhat mixed (for a very comprehensive overview on studies dealing with differences in social preferences, including ultimatum games, dictatorship games, trust games, prisoner's dilemma games and public good games see Croson and Gneezy, 2009), there remains a tendency of women to display higher ORP, in particular in the absence of any strategic components and risk concerns. Croson and Gneezy (2009) conclude that the mixed results from previous studies might be due to the fact that women are more sensitive to the environmental variables in an experiment, as the authors find a higher variability in the behavior of women in relation to men in such experimental games (this higher variability holds for between-subjects studies as well as within-subjects studies). Also, Eckel and Grossman (1998) argue that the failure to control for environmental variables such as risk factors, strategic components, and the so called "experimenter effect" might confound gender differences in this research arena, as women have been shown to be more risk averse, to react more sensitive towards who is their counterpart in the experiment, and to

care more about the judgment of other people. The authors consequently control for these factors by designing a double-anonymous dictatorship game experiment and find that women on average donate twice as much to their anonymous partners than men. Croson and Buchan (1999) find, using a trust game, that while there is no gender difference in the proposer's amount send to the responder (where a risky strategic component exists, as the proposer's payoff is dependent on the responder's decision), female responders send significantly more money back to the proposers than men (this part of the trust game basically resembles a dictatorship game, where no strategic or risky component is present). Andreoni and Vesterlund (2001) introduce various "prices of altruism" and find women to be more generous than men when the price of giving is relatively high. However, as the price of giving decreases men demonstrate larger altruistic tendencies (and for values in-between men and women give equally much). They conclude based on their findings that the "price of altruism" might be another factor why there have been conflicting results in studies concerning themselves with gender differences in ORP. In our experiment, in particular the externality attribute reflects ORP, most likely to be defined via the concept of altruism. The fertility attribute, as will be explained in more detail in section 2.3., is a mixed motive attribute. It is also strongly linked to long-term monetary goals and family values. We nevertheless expect, especially since the design of our experiment controls for the aforementioned critical environmental variables (no counterparty effect, no strategic component, anonymous treatment) and since the cost of caring for externalities (altruism) can be argued to be sufficiently high, female subjects to be placing a larger importance on both those attributes than male subjects.

2.2.4. Conjoint analysis as a method to analyze multi-dimensional preferences

In conjoint analysis, especially when using the full profile method (see below), individuals are asked to bring stimuli or scenarios – that are each characterized by a certain combination of attributes and which can be seen as simplified alternatives, e.g., choices, actions, products etc. – in an individual preference order. The method makes some assumptions (Phillips et al., 2002) that are largely consistent with the model of reasoned action by Fishbein and Ajzen (1975): each scenario is a bundle of potential attributes, each individual holds a set of utility weights for attribute levels, and the individual assesses the overall utility for each scenario. Conjoint analysis then calculates the individuals' part worth utilities of the attributes from the preference ordering of the

presented stimuli. This method appears to be ideally suited to analyze the preference structure of farmers who might trade off several attributes in their production decisions.

Hence in our study, an individual's decision to develop a certain rank-order of farming scenarios is assumed to implicitly reflect the relative importance of economic, social, and other values of that farmer. Conjoint analysis reports those relative weights in the form of the individual's part worth utilities of specific farming attributes. Implementing conjoint analysis is considered a multistep procedure (Green and Srinivasan, 1978) starting with the selection of the number of attributes, their levels, the questioning method etc. We first define four attributes that we feel are most important to many farmers' production decisions (see below) and assign plausible levels to each attribute. The full profile method is selected for the construction of the alternatives as this approach is often considered to be the most "realistic". However, since a full profile of all possible attribute level combinations would have led to a too large number of stimuli to be appropriately sorted by the respondents, we make use of a reduced number of stimuli, implementing an orthogonal design (Green and Srinivasan, 1978). Hence, each stimulus will consist of a full combination of all four attributes (with one specific level in each). In general, the preference for each scenario (P_s) is assumed to be evaluated as follows by the respondents:

$$P_s = \sum_{i=1}^{m} \sum_{j=1}^{n_i} W_i \, Y_{ij}$$

Where W_j represents the importance (part worth utility) of the attribute i, and Y_{jk} represents the desirability of level j of attribute i.

2.3. Experimental Design

The experiment, which consisted of four tasks, was designed using the experimental software z-tree (Fischbacher, 2007). Before commencing with the actual parts of the experiment, subjects were provided with detailed instructions, which were readable on the computer screen as well as read out aloud, so that it could be ensured, that all subjects thoroughly understood the structure of the experiment as well as the tasks that they were required to complete in each section. The experiment consists in addition to a fixed remuneration also of a variable component, which was determined by the lottery choice the subject made in the first part of the experiment. The fixed remuneration was set at 8

Euros for students and 32 Euros for farmers. The variable component consisted of a maximum payout of about 4 Euros for students and 12 Euros for farmers (for both remuneration components a factor of 4 was employed for the farmers due to their higher opportunity cost when participating in experiments). Once it was ensured that all subjects understood the instructions the experiment commenced.[4]

In the first part of the experiment subjects played a Holt and Laury lottery, whereby ten paired lottery choices (lottery "A" and lottery "B") were presented. This method allows eliciting an individual's level of risk propensity by observing at which lottery pair an individual makes the crossover from lottery "A" (the less risky lottery) to lottery "B" (Holt and Laury, 2002). A participant consistent with standard expected utility theory can only have one crossover point; however, some of our participants had more than one, hence exhibiting inconsistent risk attitudes. Those individuals are eliminated from the analysis whenever risk attitudes are addressed.

In the second part of the experiment, subjects were instructed to imagine being the respective farmer in the eight agricultural situations which would be presented to them shortly. They were told to consider how much they would like to be that farmer in each of the presented situations. Next, the ranking system was outlined. The situation subjects would most prefer to find themselves in as a farmer should be assigned rank 1, the second most attractive situation rank 2, and so on, with the least favorable situation receiving rank 8. Then the four attributes, which made up the agricultural situations (and in the later analysis reflect the individual's part-worth utilities), were outlined in detail. Their selection was sketched in the theory section on farmers' multidimensional utility. For each attribute, two levels were specified. The first two attributes described to the subjects pertained to income and risk, namely *(1) level of income from agricultural activity* and

[4] It should be noted that slight changes were made to the instructions after the experimental sessions with the farmers (after session 3). While we could ensure that the vast majority of farmers understood the incentive structure of the experiment (by sending them an e-mail after their participation in the experiment containing comprehension questions regarding its monetary 'incentive structure'), we felt that by making it even more explicit in the instructions that subjects were compensated for the thoroughness and time spend on their answers in part 3 and 4, as well as their lottery choice in part 1, the risks of potential misunderstandings (e.g., assuming that the actual ordering of the situations was relevant for the payoff) could be reduced. Despite these changes the full dataset is jointly analyzed as we do not expect the reformulations to have much if any behavioral consequences. The changes to the instructions have been documented and are available from the authors upon request.

(2) income volatility. Both represent short-term, monetary and self-regarding aspects. The level of income from farming could either be high (60,000 Euros after taxes) or low (20,000 Euros after taxes). Income volatility in the described agricultural situation could also either be high (30 percent) or low (10 percent).[5] Subjects were provided with calculation examples for all possible combinations in order to ensure they understand the consequences of their situation choices (e.g., *"when you have a high income of 60,000 Euros and a high volatility level, then your income level would either be 78,000 Euros or 42,000 Euros"*). The next two attributes reflect other-regarding and long-term goals, respectively. The third attribute was termed *(3) Extent of the external effects produced by the farm on the eco-system.* We defined the term "external effects" (please refer to the Appendix for a detailed description) and explained that in the upcoming situations a farmer could either demonstrate a high concern regarding the externalities produced by the farm or a low concern. The last attribute which would complete the presented agricultural situations was labeled *(4) Preservation of the fertility of the soil*. Subjects were instructed what this would involve. Again, a farmer could either display a high or low concern for this attribute. The fertility attribute is, unlike the externality attribute, characterized not only by ORP, but also partially includes self-regarding aspects, as the consequences regarding the level of concern towards this attribute affect the farmer and her operations directly (the attribute description stated: *"the farmer already has to bear the consequences of his/her respective activities during his/her lifetime…"*).

It should be noted, that the attributes were chosen on the basis of being *relevant* to the farmer, as well as *influential*, and that the attributes should be as *independent* from each other as possible (Green and Tull, 1978; Green and Srinivasan, 1978; Gustafasson et al., 2000). Based on the special characteristics surrounding in particular the farming environment the assumption of complete independence might to some degree not hold, which is something we are aware of and consider to be reasonable. The potential degree of interdependence was additionally minimized via the experimental design, as for example the description of the externality and fertility attributes were formulated in a way

[5] According to the report of the European Commission Agriculture (ECA)-FADN (2011) the average total income from farming was between 15,000 Euros to 25,000 per annual work unit in Germany for the years 2005-2007. We selected 20,000 Euros as the lower level of the income attribute and tripled this level (to 60,000 Euros) to present a high level of income. Income fluctuated within the range of -30 % to 30% for EU-27 between the years 2000-2010. We selected -10% to 10% as the lower rate of fluctuation and -30% to 30% as the higher level.

that stressed their independence (i.e., the externality attribute was described as follows: *"please be aware that external effects do not entail the fertility of your land, as those consequences apply to the farmers and will be entirely covered in the attribute described to you next."*). We also decided not to use the attribute "type of farming" (with the levels organic and conventional farming) as we consider this type of attribute to be too highly correlated with other attributes (e.g., level of profit per hectare, as well as fertility). However, the possibility that not all subjects regard the concern of "maintaining the fertility of the land" independent from profit considerations became apparent throughout the discussion sessions which took place after some experimental sessions with the agricultural science students (this will be described in more detail in section 2.4): While several students considered this attribute exclusively from a long-term environmental perspective, a large share also related it to the future profitability of the farm, which we will take into account when interpreting and discussing the results. It should be stressed, however, that the profit considerations linked with the fertility attribute are long-term considerations, whereas the "net income" attribute reflects immediate, short term monetary considerations. A detailed description of all the attributes was additionally provided to the subjects at their desk, allowing the subjects to refresh their memory when needed. Table 1 below summarizes the attributes and their respective levels.

Table 1: Overview of attributes and corresponding levels

Attribute	Level
Net income (NI)	20,000 Euros 60,000 Euros
Volatility	Income ~U(NI-10%, NI+10%) Income ~U(NI-30%, NI+30%)
Externality	Low concern for environmental externality imposed by farming operation High concern on environmental externality imposed by farming operation
Preservation of Fertility	Low concern for maintaining the land's fertility in the future High concern for maintaining the land's fertility in the future

Based on the amount and levels of attributes, 16 (2x2x2x2) different agricultural situations could have been presented to the subjects. However, as mentioned above, we decided to use a reduced stimuli set of full profile alternatives (presenting eight

situations), based on the principle of orthogonal design, as we believe even the task of ranking eight situations based on four attributes to be reasonably challenging. Finally, in this section of the experiment, the eight stimuli that had been determined via the application of the orthogonal design procedure in SPSS were presented to the subjects on the computer screen. In the third part of the experiment, subjects were then asked to rank those stimuli/farming situations according to their preferences. When this stage was entered, each subject was handed eight cards by the experimenter, each card representing one farming situation. We believe physical cards to be helpful for the subjects in the sorting process (e.g., by shuffling the cards according to their preference). However, the final ranking was then entered in the z-Tree program by the respondents. Once the ranking part was completed, subjects entered the fourth and last part of the experiment, which consisted of demographic questions. This part to some extent differed between farmers and students. While the questions in the farmer session focused on variables related to their farm (owned or as an employee), such as, i.e., the size of the farm, successor status, type of farm; for students the questions concentrated on the topics of their own' (or their families') farming background as well as their future plans to be working in agriculture and their preferences regarding conventional versus organic farming.

In order to get a feel for the subjects' perception of the experiment as well as their decision processes, verbal discussions (consisting of three to eight subjects) took place after each of the three sessions that were run with the agricultural science students from a German university with a large agricultural school. Subjects were informed after they had completed the experiment, but before they received their compensation, that they had the opportunity to discuss their experience regarding the experiment and that they would receive an additional fixed compensation fee of 3 Euros for their short participation. They were ensured that all information provided would be treated confidentially and anonymously. The duration of the discussions lasted between 10 to 20 minutes. The results of our conversations with the subjects will be used to reflect upon our findings in the discussion section. Transcripts of the discussions are available from the authors upon request.

2.4. Sample, Data Collection, and Descriptives

2.4.1. Sample and data collection

Due to the challenging task of recruiting farmers, also agricultural science students were employed as subjects. We considered them to be good surrogates for farmers as they are expected, based on their study choice, to work in the agricultural industry after completing their university degree. Additionally, many agricultural science students are known to have either grown up in an agricultural environment themselves or at least have been physically exposed to such an environment based on the compulsory internships required by the German university curriculum. For this study, the most important factor was that all subjects would be able to understand the agricultural attributes outlined to them as well as the consequences of choosing a particular level of the attribute. In other words, it was critical that all subjects were able to identify themselves with the situations presented to them. This also meant that they were aware of the implications of their choice, so that an accurate personal weighing of the attributes/preferences could be assured. Supported by the descriptive statistics, we are confident that our subject pool meets these criteria.

The experiment was conducted at three different locations in Germany between the winter of 2012 and January 2013. This time period was chosen as farmers' availability throughout the winter months is generally more likely as the amount of work (in particular for crop farmers) is considerably reduced. The first two experimental sessions were run at the experimental laboratory of a major university in Germany with N=14 agricultural students in November 2012. The next session, conducted in early December 2012, was run with N=19 farmers via a lab in the field experiment (making use of a mobile experimental laboratory). The chosen location was Uelzen, a medium-sized town in Lower Saxony. The farmers who participated in the experiment were participants of a work group, meeting regularly during the winter months. The farmers were invited via e-mail. The information provided to them included that the experiment was run as part of a study examining the decision-making behavior of farmers, the range of compensation and the length of the experiment (45 minutes). Anonymity and confidentiality were assured. The last three experimental sessions were also conducted via a mobile laboratory in January 2013 with N=35 agricultural students at a German university with a large

agricultural school. All students were invited to participate in the experiment by announcements in lectures. Thereby, the same information was provided as to the farmers.

2.4.2. General descriptive statistics

Table 2 summarizes the general descriptive statistics of our data. The average age of our participants is 26 years. One quarter of our subjects are female (28 percent for students; 16 percent for farmers). As expected, the agricultural science students appear to be good proxies for farmers: 60 percent of our student subjects grew up directly in an agricultural environment as their parents were or still are working within this industry. Furthermore, 94 percent of the students in our sample consider working within the agricultural sector upon completion of their degree, which makes them potential producers of agricultural goods in the near future. While about 70 percent of the students prefer conventional farming, 30 percent prefer an organic farming approach. 85 percent of the farmer subjects possess their own farm. The average farm (land) size consists of 272 hectares, whereby it should be noted that there is a large variability in this regard. The smallest farm in our sample operates on 70 hectares, while the largest farm works on 750 hectares. On average 4.5 employees are employed per farm. The results from the Holt and Laury lottery show that our subjects are on average risk averse, with the average crossover point at lottery pair number six, which is a frequently observed tendency (Holt and Laury, 2002)

Table 2: General statistics of participants

	Student	Farmer	Pooled
Age	24.06 (3.886)	30.68 (7.853)	25.91 (6.029)
Female ratio	0.286	0.156	0.250
Parents in farming	0.592 (0.497)		
Farming as career	0.939 (0.242)		
Organic-favored	0.305		
Farm ownership ratio		0.842	
Years of possession (farm)		5.684 (7.111)	
# of employee		4.579 (2.341)	
Farm size (land)		272.6 (220.0)	
Risk aversion (turning point)	6.182 (1.646)[a]	6.000 (1.732)	6.140 (1.652)
# of obs	49	19	68

Standard deviations in parentheses. [a]: sample size=44 for students, 13 for farmers, 57 for pooled. Variable "Farming as career" represents students' inclination to choose farming as their occupation in the future. The variable "Organic-favored" represents what type of farming (organic vs. conventional) agricultural science students prefer.

2.4.3. Average rankings of situations

This section reports on the average ranks that our subjects assigned to the eight presented farming scenarios. Again, the most preferred situation received rank 1 and the least favorable situation received rank 8. Table 3 summarizes the average rankings for each presented farming scenario. The second column presents the actual levels of the attributes for the respective situation. Column three presents the average ranking of each scenario. Based on the described ranking criterion, situations E, H and A present the top three ranked and thus most favorably perceived situations. Within those scenarios, high income, low volatility, and high concerns with respect to environmental externality and land fertility appear at least twice whereas, not surprisingly, the other (not preferred) attribute levels appear at least twice in farming scenarios C, B, and D, which mark the bottom according to the average rankings by our respondents. This result gives a strong indication that our selection of attributes and attribute levels leads to appropriate responses and that (at least) the majority of our respondents were able to digest the numerous trade-offs they had to make. It is particularly interesting to observe that the most favorably ranked situation E is characterized by low income (all other goals being

"optimal", with low volatility and high concerns for fertility and externality), already indicating that profit does not necessarily have to present a superior role in the decision making process of producers as standard economy theory would suggest.

Table 3: Average ranking of situation

Situation	Description	Ave. ranking	Std. dev.
A	$I_{60,000}$, V_{10}, E_H, F_L	3.176	(1.050)
B	$I_{20,000}$, V_{30}, E_H, F_L	6.750	(1.164)
C	$I_{20,000}$, V_{10}, E_L, F_L	7.265	(0.971)
D	$I_{20,000}$, V_{30}, E_L, F_H	5.750	(1.250)
E	$I_{20,000}$, V_{10}, E_H, F_H	1.676	(1.112)
F	$I_{60,000}$, V_{30}, E_H, F_H	4.117	(1.399)
G	$I_{60,000}$, V_{30}, E_L, F_L	5.162	(1.532)
H	$I_{60,000}$, V_{10}, E_L, F_H	2.103	(1.161)

I: net income; V: volatility; E: negative externality; F: fertility

2.5. Findings

In this section the preferences of farmers over the four presented attributes (i.e., those attributes' part worth utilities) are analyzed within multivariate statistics, i.e., conjoint analysis and cluster analysis. The latter is an important addition to running conjoint analysis on the full sample as farmers are considered to be quite heterogeneous in their goals as well as in their decision making, so that by clustering farmers according to their goals or preferences might lead to some interesting insights. We finally try to relate cluster membership to the specific characteristics of the sub-samples (farmers and students). Please note that we are going to discuss some of the straightforward findings in this section. Some will be revisited in the discussion section, mainly from the perspective of motivation crowding theory.

2.5.1. Preferences of farmers

Possessing each respondent's rankings of all eight farming scenarios, we are able to compute the importance of each attribute (part-worth utility) for each individual using conjoint analysis. The average results are reported in Table 4. Column two to four present the average relative importance of attributes to individuals when facing farming operation decisions. We report those results for students, farmers, and both groups pooled together

and also by gender. Students largely share their preferences with farmers as expected based on their study background and future career plans. Interestingly, there is a notable (but not statistically significant) difference with respect to the fertility attribute: With farmers, this attribute turns out to be more important than with students. Still, fertility proves to be on average the most important attribute across all subjects (30.79) followed by volatility (27.43), income (25.25) and externality (16.52), respectively. While externality is the lowest ranked attribute in terms of relative importance, its value of 16.52 nonetheless highlights that subjects still regard this attribute as critical within their decision-making process.

Table 4: Part-worth utilities for all subjects

	Ave. relative importance (%)				
Attribute	Students (49) (Male/Female)	Farmers (19) (Male/Female)	Pooled (Male/Female)	Levels	Utility (part-worth)
Income	26.292	22.563	25.250	60000E	.860
	(26.83/24.94)	(23.44/17.86)	(25.77/23.69)	20000E	-.860
Volatility	27.670	26.814	27.431	30%	-.945
	(28.87/24.68)	(27.66/22.32)	(28.49/24.26)	10%	.945
Externality	16.616	16.275	16.520	Low	-.570
	(14.79/21.17)	(14.97/23.21)	(14.85/21.53)	High	.570
Fertility	29.422	34.348	30.798	Low	-1.088
	(29.51/29.21)	(33.92/36.61)	(30.89/30.51)	High	1.088

The part-worth utilities in the last column confirm the relative importance results: Subjects gain the highest positive part-worth utility from a high concern with respect to fertility of their land (1.088), followed by low volatility (0.945), high income (0.860) and a high concern for externalities (0.570). As expected, we find a statistically significant difference between men and women with the externality attribute in the hypothesized direction (p=0.033 one-tailed). Females place significantly more weight on the externality attribute (which could be interpreted as an altruistically characterized preference) as their male counterparts.

2.5.2. Cluster analysis on farmers' preferences

As past studies have shown that farmers display very heterogeneous production choices, it would be insightful for agricultural policy if we are able to identify subgroups of farmers with different preference-structures. The method of cluster analysis might additionally allow us to analyze the motivation sources (extrinsic vs. intrinsic) of farmers as it splits subjects of a dataset into groups or clusters in a way that objects within one cluster are very similar based on the variables used as distinguishing criterion (in our case the four attributes/part-worth utilities), while at the same time the differences between the clusters should be as large as possible. Table 5 presents the results of this procedure. Column two to four presents the average relative importance of each attribute for each of the clusters. Column five and six summarize the statistics of the ANOVA test, which shows whether the average relative importance between the clusters differs significantly.

Table 5: Clusters of preference

	Cluster			ANOVA	
	1	2	3	F	Sig.
Income	12.50	32.05	13.96	65.929	.000
Volatility	18.75	32.79	18.01	23.519	.000
Externality	44.35	11.07	18.72	48.349	.000
Fertility	24.40	24.08	49.32	61.797	.000
# of farmers (% of farmers)	1 (5.3%)	12 (63.2%)	6 (31.6%)		
# of Agri Students (% of st)	6 (12.2%)	31 (63.3%)	12 (24.5%)		
Farmer ratio in cluster	14.3%	27.9%	33.3%		

*: parentheses are numbers for student and farmer respectively.

Participants were clustered into three groups.[6] Cluster 1, which contains *N*=7 subjects (10 percent of our sample) demonstrates a high level of concern regarding the external effects produced by the farm on the eco-system (44.35), as well as a considerable concern to preserve the fertility of the soil (24.40). In comparison, the concerns for volatility (18.50) and income (12.50) are rather low. Like cluster 1, also cluster 3, which contains *N*=18 subjects (27 percent of our sample) is characterized by strong preferences for long term goals, reflected by the high average importance for the fourth attribute "preserving the fertility of the soil" (49.32). Interestingly, the preference for reducing environmental externalities is somewhat lower than in cluster 1 (18.71). However, also for this cluster the volatility (18.01) and income (13.96) attributes receive a rather low importance weighting. Cluster 2 demonstrates, on the contrary to cluster 1 and cluster 3, a much stronger tendency towards short-term, monetary and selfish goals reflected by the strong preference for the income (32.05) and volatility (32.79) attributes, whereas the externality attribute (11.07) is the least preferred.

2.5.3. Characteristics of individuals in the clusters

We separately report on some descriptive characteristics for all three clusters in Table 6. While we report on age, female ratio, and risk propensity jointly for all subjects,

[6] The optimal number of three clusters was selected based on the screen plot (elbow diagram) run by Wald's hierarchical clustering method applying squared Euclidean Distance as the distance or similarity measure.

based on the fact that some questions partially differed for students and farmers, some results will be reported by occupation.

Overall, the average age is quite similar across all clusters as is the level of risk propensity. Cluster 1 contains slightly more females in comparison to the other two clusters. When analyzing the clusters by occupational group, for the students the descriptive variables age, female ratio, risk propensity and farming as career ratio are close in all three clusters. However, in cluster 1 fewer students report having parents who work or used to work within the agricultural industry. Also, more students within this cluster prefer to work on an organic farm in comparison to the other two clusters.

Table 6 shows farmers in cluster 3 to be in the possession of their farm for longer time periods (displaying a possibly longer work experience within the agricultural sector for farmers not owning the farm) and to be operating on average on larger farms (land) than the farmers in cluster 1 and cluster 2.

2.6. Discussion of Findings

This section will in particular discuss the findings from section 2.5.2., making use of motivation crowding theory. Recall that we assume a person exhibiting a high level of priority (and thus a high level of utility) for certain non-monetary actions, like a high concern for externalities, in combination with a low level of priority for monetary consequences, such as profits, to be intrinsically motivated. On the other hand, we assume a person who derives a high utility from profits to be easier motivated to perform actions that have no direct positive effect on profits, if she is somehow compensated (i.e., by policy) via monetary incentives for doing so.

Table 6: Statistics of clusters

		Cluster 1	Cluster 2	Cluster 3
All	Age	25 (5.66)	25.95 (5.26)	26.17 (7.95)
	Female ratio	0.429	0.209	0.278
	Risk aversion[a]	6 (1.095)	6.075 (1.639)	6.154 (2.075)
	# of obs	7	43	18
Students	Age	23 (2.19)	24.81 (4.11)	22.67 (3.65)
	Female ratio	0.333 (0.516)	0.258 (0.445)	0.333 (0.492)
	Risk aversion[b]	6 (1.095)	6.172 (1.670)	6.33 (2.0)
	Parents in farming	0.333 (0.516)	0.613 (0.495)	0.667 (0.492)
	Farming as career	1 (0)	0.903 (0.301)	1 (0)
	organic-favored	0.667	0.290	0.167 (0.389)
	# of obs	6	31	12
Farmers	Age	37 (0)	28.92 (6.8)	33.17 (9.87)
	Female ratio	1 (0)	0.08 (0.289)	0.167 (0.408)
	Risk aversion[c]	/	6.111 (1.453)	5.75 (2.5)
	Ownership ratio	1 (0)	0.75 (0.452)	1 (0)
	Years of possession	1 (0)	4.58 (4.89)	8.67 (10.56)
	# of employee	3 (0)	4.92 (2.71)	4.17 (1.60)
	Farm size (land)	110 (0)	258.8 (205.3)	327.3 (268.5)
	# of obs	1	12	6

Standard deviations in parentheses. [a]: sample size=6 for Cluster 1, 40 for Cluster 2, 13 for Cluster 3. [b]: sample size=6 for Cluster 1, 29 for Cluster 2, 9 for Cluster 3. [c]: sample size=0 for Cluster 1, 9 for Cluster 2, 4 for Cluster 3

Cluster 1 is characterized by a high level of concern regarding externalities as well as, albeit to a somewhat lower degree, the preservation of the land's fertility, while volatility and income play a subordinated role. Based on our assumption, this finding suggests that for cluster 1 no monetary incentives to perform environmentally sound practices are required or actually even desirable, as these farmers are likely to be *intrinsically* motivated to do so and that, in fact, external interventions could perhaps have a negative impact on the extent to which the farmer will engage in future environmental

practices (the size of the effect would depend on the exact impact of the external intervention onto the intrinsic motivation, something we are unable to analyze). A possible reaction to the introduction of extrinsic interventions could be that farmers from this cluster might demand higher monetary compensation in order to perform the same extent of environmentally friendly operations as prior. This argument is based on the findings of Frey and Götte (1999) who found, when studying how financial rewards affect the intrinsic motivation of voluntarily workers in Switzerland, that at least CHF 75 per month would be required as compensation fee in order to obtain the same working hours as when no rewards were offered (a similar finding is presented by Gneezy and Rustichini (2000) who also find a non-monotonic relationship between monetary compensation and performance). Consequently, a successful policy would need to be very sensitive towards such factors, and providing purely monetary incentives might not present the ideal compensation strategy, as they could potentially cause detrimental effects or become extremely expensive. Research has studied the effect of other, potentially more effective reward structures for intrinsically motivated individuals, e.g., verbal rewards or positive feedback have been shown to enhance intrinsic motivation (Deci, 1971; Deci et al. 1999; Frey and Jegen, 2001). We will outline policy suggestions, which in our opinion might be potentially more effective for this cluster in section 2.7. (future research).

The findings generated for cluster 2, on the other hand, (recall that this cluster was characterized by a much stronger tendency towards short-term, monetary and selfish goals) suggest that these types of farmers could respond positively to financial incentives (policy subsidies) as their intrinsic motivation is likely to be increased by external incentives, based on our assumptions. Note, that while profit plays the most important role when trading-off farming situations, this cluster still places such a considerable value on the attribute of fertility (24.08) in comparison to the externality attribute (11.07). Consequently, for this cluster fertility could predominantly be considered a (long-term) monetary attribute. The argument regarding their motivation source however is not affected by this.

More difficult is the interpretation for cluster 3, which displays a very high concern for fertility but a comparatively low one for externalities, income and volatility. This cluster could be described as particular responsible, as their interest to maintain the quality and sustainability of the land by far outweighs all other attributes: Cluster 3

allocates as little weight to the income and volatility attribute as cluster 1, while externalities obtain twice as much average relative importance in comparison to cluster 2. The fact that fertility receives such a predominant level of importance could be due to the fact that farmers within this cluster are strongly motivated to hand over fertile operations to future generations. Family is recognized to play a big influence on farmers, especially the desire to pass the farm on to future generations of the family (Barclay et al., 2007). This desire could be reflected by the results of cluster 3. An additional explanation could stem from the social distance literature where people persistently show more generosity to those that are relatively close to them or who are mentally perceived as being closer (Hoffman et al., 1996; Charness and Gneezy, 2008). This could also explain why externalities play an important but not primary role, as this attribute is much more linked to the general public than family. However, as mentioned in section 2.3., based on the fact that fertility considerations might not always be entirely independent of monetary considerations (as they affect the future productivity of the farm) other interpretations are possible. Do farmers in this cluster hold an intrinsic motivation to perform environmentally beneficial practices? This is particularly difficult to establish as the income and externality preferences are relatively low in comparison to the fertility attribute. Based on the possibility that fertility concerns might bear extrinsic motivations (long-term profits) as much as intrinsic motivations (environmental concerns), we cannot derive a distinguishable motivation source. We believe however, that cluster 3 is at risk of being crowded out (this applies at least for a portion of this cluster), as indicated by the considerably low average weighting of the income attribute. From an agricultural policy perspective this cluster is of high importance, as the farmers within this cluster own on average the largest farms (327 ha), so that in particular their contribution towards environmentally sound practices is especially desirable. Consequently, future research which manages to disentangle the combined forces present here is highly desirable.

Note, that despite the fact that the majority of subjects (63 percent of our sample) are grouped in cluster 2, we still have encouraging news for environmental and long-term concerns. First of all, even in cluster 2, where income and volatility were strongly preferred, the two goals of maintaining the fertility of the land and reducing externalities play a non-negligible role. Secondly, around 37 percent of subjects do not belong to cluster 2 and those demonstrate even more pronounced preferences to bear environmental

responsibility and to focus on the long-term fertility of their land rather than focusing on financial returns.

Our findings also indicate females to be placing a significantly larger weight on the externality attribute in comparison to their male counterparts. Being concerned about externalities is related to altruistic tendencies, as it is for the most part the general public rather than the farmer herself who is affected by the consequences of produced externalities. Consequently, our study is supportive of previous studies indicating women to be more prosocial than men. While farming in Germany is still dominated by male farmers (68.3 percent in 2010)[7] given our results, a trend towards a more balanced gender occupation seems to be highly desirable, as female farmers might offer a distinct, socially perhaps more balanced farming approach. In our assumption regarding an individual's level of intrinsic motivation, which consequently affects the possibility of a crowding out effect, the externality attribute played a central role. Mellström and Johanneson (2008) found, conducting an experiment on blood donation with three treatments (donating blood without any form of compensation, receiving compensation for the donation, and the choice whether to keep the compensation or donate it to charity), a significant crowding out effect for women, while the supply by male subjects did not significantly change across the three treatments. Given that crowding out might in particular affect females, and given that it is in particular the female farmer, who is concerned about externalities (demonstrates a high level of intrinsic motivation) suggests that specifically this sub-group is at a considerably higher risk of being crowded out once the wrong incentive schemes are introduced.

2.7. Limitations, Future Research, and Conclusions

There are few limitations to our study. The situations presented in our experiments are specifically tailored to agricultural operation decisions. Moreover, the subject pool consisted of the natural groups of farmers and agricultural science students. Consequently, the results are somewhat limited to the application for this specific domain. Thus, future research may extend the analysis to other domains such as utility dimensions of non-farming entrepreneurs or managers.

[7] Statistisches Bundesamt (2012)

Future research would also need to establish whether our assumption holds that (a) a person demonstrating high priority levels for certain non-monetary actions - like a high concern for externalities in combination with a low level of priority for monetarily linked actions, such as profits, is in fact intrinsically motivated; and (b) whether a person who derives a high utility from the profit attribute in our experiment is easier motivated to perform certain actions when compensated with monetary incentives for doing so. However, to us the assumption seems plausible and is ultimately based on theory as well as empirical findings. Once this has been confirmed for the individual clusters, it would be important to analyze whether one can establish acceptable and equitable criteria, which would allow for the detection of farmers' cluster membership, as such "real-life" segmentation would be essential in order to be able to discriminate the incentives for each cluster effectively. The selection of segmentation criteria is so important since, perhaps, part of the farmers would get direct monetary compensation for environmental actions and others would not.

We are hence aware of the fact that such a segmentation is neither trivial nor straightforward and that the selected distinguishing criteria have to be valid and justifiable (e.g., future research could check whether the criterion of organic vs. conventional farming has something to offer in this regard). How could effective incentives for such farmers be designed? While verbal rewards (or positive feedback) might work, we do not consider them to be the ultimate solution. We believe one solution could be to offer task-non-contingent rewards for farmers represented by cluster 1 (and probably for part of farmers represented by cluster 3). Studies have shown that intrinsic motivation decreases (crowding-out occurs) when a reward is contingent on performance. However, if the compensation is set independent of the performance of the task intrinsic motivation levels are not affected (e.g., Deci et al., 1999 provide a meta study on the topic). A practical implementation of this could be via the creation of cooperatives for farmers displaying high intrinsic motivations for reducing externalities and to offer these cooperatives a fixed amount of compensation independent of their task performance. We know that this policy suggestion is provocative and in need of a lot more refinements and adjustments, something future research projects should focus on. We believe however, that innovative, effective policy instruments are required in order to get farmers to participate more efficiently and actively in environmental programs.

Our paper extends the previous multidimensional preference literature from the consumer's to the producer's sphere via the example of farming. We tested farmers' preferences over four attributes, of which two are short-term monetary and self-regarding aspects whereas the remaining two present other-regarding and long-term goals. We find that most farmers consider the long-term goal of maintaining the fertility of their farm land to be more important than any of the other goals, for example income and risk. Although fertility is a mixed-motive attribute, this finding is important since it provides evidence that not only consumers but also producers do not always solely engage in profit maximization as standard economic theory suggests. Finally, externalities play a non-negligible role with most farmers.

Applying cluster analysis, we could identify considerable preference heterogeneity among farmers, however, and related these findings to policy implications, thereby discussing in particular the role of motivational sources (extrinsic vs. intrinsic). Three clusters were found: Cluster 1 exhibiting a great interest in keeping negative externalities low and perhaps being very intrinsically motivated; cluster 3 strongly tending to maintain land fertility, probably with mixed intrinsic and extrinsic motives; and cluster 2 focusing on profit maximization and risk minimization, perhaps being most extrinsically motivated of the three.

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3. ESSAY NO. II

Do social entrepreneurs operate social businesses?

Tanja Jänicke & Christine Lauritzen

The concept of social entrepreneurship is not entirely new but has increasingly attracted the interest of researchers since the beginning of the new millennium (Short et al., 2009). However, there is still no clear, agreed-upon definition of what social entrepreneurship really means or entails (Mair and Martí, 2006; *Choi and Majumdar, 2014; Saebi et al., 2019). In this paper, we define a social entrepreneur by their preferences, not by the type of business they operate. To measure preferences, entrepreneurs from social and commercial businesses participated in a conjoint experiment. The results show that social and commercial business owners do not differ systematically in their preferences. Two types of entrepreneurs are identified – one with strong monetary preferences, the other with strong social and ecological preferences, our definition of a social entrepreneur. Both monetary-driven and social entrepreneurs can be found to operate social as well as commercial businesses. Since social business owners do not differ in their preferences from commercial business owners, there must be other reasons why they choose to operate such a business. Researchers suggest that there might be a "warm glow" they receive in their work, for example, in the form of recognition by others (Baron, 2007). Therefore, it is tested whether the perception of their responsible behavior is more important for social than for commercial business owners. Our results do not support this hypothesis. Due to the scarcity of quantitative research in the domain of social entrepreneurship, especially in the distinction between social and commercial businesses, this paper closes a research gap by providing important insights into the preference structure of entrepreneurs. The paper further offers a new view on the term social entrepreneurship.*

3.1. Introduction

"The social responsibility of business is to increase its profit" – this popular and much-cited claim by Milton Friedman summarizes pretty well the basic idea dominating economic theory for a long time (Friedman, 1970). In this theory, the firm is a profit-maximizing entity and the consumer a homo economicus who wants to maximize his utility, usually based on monetary preferences. In his book "*Social responsibilities of the business man*", Howard R. Bowen was one of the first to discuss the responsibilities of business owners and managers to not exclusively serve their company in terms of profitability, but to also serve society by contributing to the overall public welfare (Bowen, 1953). Building up on this, the literature about *corporate social responsibility* (CSR)[8], expanded significantly (Carroll and Shabana, 2010). In the 1980s, for the first time the notion developed that some enterprises might not hold any profit-seeking motives but rather focus on *social goals* in an innovative way (Bacq and Janssen, 2011). The term *social entrepreneurship* then emerged in the late 1990s in the scientific literature (Bacq and Janssen, 2011). Thereby, the classification as to what exactly defines a *social entrepreneur* is still an open debate in the scientific literature (Mair and Martí, 2006; Choi and Majumdar, 2014, Saebi et al., 2019). Something this paper investigates in detail. To be more precise, the development of a social entrepreneurship definition has been mainly elaborated from a theoretical perspective, we offer an empirical assessment in this regard.

Since the first debates, the sentiments about the responsibilities of companies have made a notable shift. Generally, due to the pressing environmental issues our planet is currently facing a larger share of consumers, and society in general, have become increasingly interested and informed about issues, such as resource scarcity and global warming. Events such as "*Fridays for future*" have put our global ecological problem on the map. Sustainability is one of the biggest challenges for our society, in particular given our ever-increasing demand for resources. In a similar manner do increasing wealth inequalities place pressing concerns on our societies (Aghion et al., 2019; Acemoglu and Robinson, 2006; Acemoglu and Robinson, 2000).

[8] The Business Dictionary defines CSR as "a company's sense of responsibility towards the community and environment (both ecological and social) in which it operates. Companies express this citizenship (1) through their waste and pollution reduction processes, (2) by contributing educational and social programs and (3) by earning adequate returns on the employed resources." For a great review regarding the development of the construct of CSR and its resulting definitions see Carroll (1999).

Given the elevated importance of environmental as well as social concerns, we believe that entrepreneurs with their creative and innovative decision-making play a crucial role for the implementations towards a more sustainable paradigm shift. Markman et al. (2016) proclaim how, given the severity of our ecological issues, it is not sufficient anymore to merely *balance* the triple bottom line of CSR. The authors propose that in order to be a sustainable and ethical entrepreneurial enterprise, ventures need to balance environmental goals *first*, followed by societal goals and *lastly* focus on economic goals. Yet, the Global Entrepreneurship Report of 2019/20 reports that the main motivation for starting up a new venture is still predominantly driven by economic concerns (i.e., "to build great wealth or high income") (Bosma et al., 2020).

Based on the just described elevated need towards more environmental and societal decision-making in the business context, this paper aims to investigate how entrepreneurs operate their ventures from this perspective. *More specifically, we intend to investigate whether social entrepreneurs operate social businesses.* This may seem tautological, as these two terms are often used synonymously. However, in line with Markman's et al. (2016) proposition, we define social entrepreneurs in a way, which will offer a distinctive view on the phenomenon of social entrepreneurship.

The entrepreneurship literature, when distinguishing between social and commercial entrepreneurs does so mainly on the basis of the company's mission, also termed the *mission-based approach* (i.e., Dees, 1998; Bacq and Janssen, 2011). Thereby, if the mission of a business follows a social objective, the founder is consequently classified as a *social entrepreneur*. In this paper, we shift this perspective and introduce a new criterion of distinction, namely the entrepreneur's *weighing of the attributes* as described by the triple bottom line (Elkington, 1998). A *social entrepreneur* in this paper is consequently characterized *by a stronger weighing of environmental and social attributes relative to economic ones*. Analogously, a *commercial entrepreneur* is characterized *by strong monetary preferences in relation to environmental and social ones*. Our definition of a social entrepreneur is thereby completely independent of the venture's pursued mission. This means, based on our definition, also the founder of a business with a *commercial mission*, can be defined as a *social entrepreneur* - if his operational preferences are dominated by ecological and social concerns, rather than monetary ones. We believe this

new approach offers some very valuable insights towards the discussion as to what in today's society constitutes social and sustainable entrepreneurship; and whether exclusively defining social entrepreneurship based on the venture's mission or profit structure offers the most informative concept or definition.

We experimentally analyze this research question by running a conjoint experiment with *N*=45 entrepreneurs, who run either *commercial* or *social businesses*: In our experimental design, the *type of business* these entrepreneurs operate is thereby strictly defined by the *venture's mission.* This allows us to investigate whether *social/commercial businesses* are exclusively operated by *social/commercial entrepreneurs,* or whether there is a mixture across these two domains.

Our findings show that social entrepreneurs, defined by their preferences, operate social businesses, but not exclusively. Social entrepreneurs also operate commercial businesses. Analogous, we find monetarily driven entrepreneurs to not exclusively operate commercial businesses. They also run social businesses.

The paper is structured as follows, in the next section, we review literature dealing with the definitions of *social entrepreneurship* and *social business* from an array of perspectives. We conclude the section by deriving our own working definitions as well as our hypotheses. Based on these working definitions, we outline our resulting experimental design in section 3. Section 4 presents the data as well as its analysis. This is accompanied by a discussion of the results and its implications. As with most studies, our study has some limitations, which are discussed in section 5. The paper concludes in section 6.

3.2. Theoretical Background

3.2.1. Social entrepreneurship in the literature

While social entrepreneurship is nothing new within the field of entrepreneurship research, it has in particular for the past 20 years received attention at an increasing rate (Short et al., 2009; Bacq and Janssen, 2011). Thereby, the definition as to what exactly social entrepreneurship entails, and who can be classified as a social entrepreneur, based on which criteria, is still an open debate (Mair and Martí, 2006; Choi and Majumdar,

2014). In the words of Martin and Osberg (2007, p. 29): *"Social entrepreneurship is attracting growing amounts of talent, money and attention. But along with its increasing popularity has come less certainty about what exactly a social entrepreneur is and does".* Very little empirical research, especially quantitative work, has been done in this field (Mair and Martí 2006; Short et al., 2009; Hoogendoorn et al., 2010). Rather, the attempt to define *social entrepreneurship* has focused on a *theoretical* discussion. Despite – or maybe even due to – a growing body of theoretical literature, there is still no consensus about the exact meaning of the term. Researchers face numerous, often even conflicting, definitions and concepts of *social entrepreneurs*, also due to the fact that various disciplines study this phenomenon[9] (Roberts and Woods, 2005; Weerawardena and Mort, 2006; Short et al., 2009). Mair and Martí (2006, p. 36) describe the concept of social entrepreneurship as "[…] poorly defined and its boundaries to other fields of study remain fuzzy". Our paper contributes here by offering new understandings on this topic via an empirical approach.

Despite the empirical lack of research in this domain (Hoogendoorn et al., 2010; Bacq et al., 2011), several authors argue that commercial entrepreneurship systematically differs to social entrepreneurship[10] (Mair and Martí, 2006[11]; Austin et al., 2006; Martin and Osberg, 2007). The aim of this paper is to empirically investigate these potentially systematic differences between social and commercial entrepreneurs. Thereby, the criterion of distinction proposed is based on the entrepreneur's weighing of the CSR's triple bottom line attributes namely economic, social and environmental aspects (Elkington, 1998). We review and discuss the status of definitions from this field, as this will be relevant for our experimental design, outlined in section 3.

[9] Social entrepreneurship is for example being studied in management, entrepreneurship, political sciences, economics, law and education.

[10] Please note that due to the lack of literature concerning only social businesses and commercial businesses in this chapter papers are cited that mostly use a broad definition of social enterprises – not only including businesses but also social or community initiatives both from the for-profit and non-profit sector.

[11] On the other hand, Mair and Martí (2006) emphasize that commercial and social entrepreneurs also have some characteristics in common: they both follow a vision and gain satisfaction from realizing their idea. This is supported by Bacq and Janssen (2011), who find that both groups share some traits like an entrepreneurial spirit, a focus on vision and opportunity, and the ability to persuade others of their idea.

Table 7 and Table 8 on the following two pages provide an overview of social entrepreneurship definitions in the literature: for the concept of *social entrepreneurship* in general (Table 7) and for the *social entrepreneur* (Table 8). Definitions stem mostly from academia, but partially also from practical applications as they find application in our experimental design (specifically the ones from Ashoka and Social Impact).

The presented definitions vary with regard to some factors, which we discuss in more detail in the next sub-sections. While some definitions focus on the *mission of social value creation* (e.g., Dees, 1998; Austin et al., 2006; Peredo and McLean, 2006; Weerawardena and Mort, 2006; Zahra et al., 2009), others make their distinction based on a for-profit (commercial) or non-for-profit (social) basis.

Table 7: Definitions of social entrepreneurship in the academic literature

Publication	Definition of social entrepreneurship
Dees (1998)	"Social entrepreneurship combines the passion of a social mission with an image of business-like discipline, innovation, and determination commonly associated with, for instance, the high-tech pioneers of Silicon Valley" (p.1.)
Tan et al. (2005)	= an altruistic form of entrepreneurship
Roberts and Woods (2005)	"Social entrepreneurship is the construction, evaluation and pursuit of opportunities for transformative social change carried out by visionary, passionately dedicated individuals." (p.49)
Austin et al. (2006)	"We define social entrepreneurship as innovative, social value creating activity that can occur within or across the nonprofit, business, or government sectors." (p.2)
Mair and Martí (2006)	"A process of creating value by combining resources to pursue opportunities to catalyze social change and/or address social needs." (p.37)
Peredo and McLean (2006)	"social entrepreneurship is exercised where some person or group: (1) aim[s] at creating social value, either exclusively or at least in some prominent way; (2) show[s] a capacity to recognize and take advantage of opportunities to create that value ("envision"); (3) employ[s] innovation, ranging from outright invention to adapting someone else's novelty, in creating and/or distributing social value; (4) is/are willing to accept an above-average degree of risk in creating and disseminating social value; and (5) is/are unusually resourceful in being relatively undaunted by scarce assets in pursuing their social venture."
Robinson (2006)	"I define social entrepreneurship as a process that includes: the identification of a specific social problem and a specific solution…to address it; the evaluation of the social impact, the business model and the sustainability of the venture; and the creation of a social mission-oriented for-profit or a business-oriented nonprofit entity that pursues the double (or triple) bottom line.
Weerawardena and Mort (2006)	"We define social entrepreneurship as a behavioral phenomenon expressed in a NFP organization context aimed at delivering social value through the exploitation of perceived opportunities." (p. 25)
Martin and Osberg (2007)	Social entrepreneurship has three components: "1) identifying a stable but inherently unjust equilibrium that causes the exclusion, marginalization, or suffering of a segment of humanity that lacks the financial means or political clout to achieve any transformative benefit on its own 2) identifying an opportunity in this unjust equilibrium, developing a social value proposition, and bringing to bear inspiration, creativity, direct action, courage, and fortitude, thereby challenging the stable state's fortitude 3) forging a new, stable equilibrium that releases trapped potential or alleviates the suffering of the targeted group, and through imitation and the creation of a stable ecosystem around the new equilibrium ensuring a better future for the targeted group and even society at large." (p. 35)
Zahra et al. (2009)	"encompasses the activities and processes undertaken to discover, define, and exploit opportunities in order to enhance social wealth by creating new ventures or managing existing organizations in an innovative manner." (p. 519)
Bacq and Janssen (2011)	"We define social entrepreneurship as the process of identifying, evaluating and exploiting opportunities aiming at social value creation by means of commercial, market-based activities and of the use of a wide range of resources." (p. 376)
Grove and Berg (2014)	"is generally defined as an activity or organization with social values and aims employing business concepts and tools in some form." (p.11)

Table 8: Definitions of the social entrepreneur in the academic literature and from practical applications

Publication	Definitions of social entrepreneur
Dees (1998)	"Social entrepreneurs are change agents who adopt a mission to create and sustain social value by "recognizing and relentlessly pursuing new opportunities to serve that mission, engaging in a process of continuous innovation, adaptation and learning and acting boldly without being limited by resources currently in hand, and constituencies served and for the outcomes created" (p. 4)
Tan et al. (2005)	"A legal person engaged in the process of entrepreneurship that involves a segment of society with the altruistic objective that benefits accrue to that segment of society" (p. 360)
Baron (2007)	= entrepreneur "who is willing to form a CSR (firm) at a financial loss" (p. 697)
Martin and Osberg (2007)	"Someone who targets an unfortunate but stable equilibrium that causes the neglect, marginalization, or suffering of a segment of humanity; who brings to bear on this situation his or her inspiration, direct action, creativity, courage and fortitude; and who aims for and ultimately affects the establishment of a new stable equilibrium that secures permanent benefit for the targeted group and society at large" (p.39)
Bacq and Janssen (2011)	"The social entrepreneur is a visionary individual, whose main objective is to create social value, able at one and the same time to detect and exploit opportunities, to leverage resources necessary to his/her social mission and to find innovative solutions to social problems of his/her community that are not properly met by the local system. This will make him/her adopt an entrepreneurial behaviour."
Ashoka (2014)	"Social entrepreneurs are individuals with innovative solutions to society's most pressing social problems. They are ambitious and persistent, tackling major social issues and offering new ideas for wide-scale change. Rather than leaving societal needs to the government or business sectors, social entrepreneurs find what is not working and solve the problem by changing the system, spreading the solution, and persuading entire societies to move in different directions. Social entrepreneurs often seem to be possessed by their ideas, committing their lives to changing the direction of their field. They are visionaries, but also realists, and are ultimately concerned with the practical implementation of their vision above all else. Social entrepreneurs present user-friendly, understandable, and ethical ideas that engage widespread support in order to maximize the number of citizens that will stand up, seize their idea, and implement it. Leading social entrepreneurs are mass recruiters of local changemakers— role models proving that citizens who channel their ideas into action can do almost anything"
Social Impact (2014b)	" Entrepreneur who tries to solve a social problem, who does not pursue financial profits but rather success for society, whose values are based on democracy, human dignity and sustainability, who is able to recruit interested stakeholders and acquire the necessary human and material resources to pursue his idea"

3.2.1.1. Social entrepreneurship: The mission-based approach

Austin et al. (2006) define the most fundamental difference between social entrepreneurs and their commercial counterparts in their differing *missions.*[12] Other researchers also make the distinction between social and commercial entrepreneurs based on a mission perspective, albeit to varying degrees. Taking a more flexible approach, Tan et al. (2005) regard social entrepreneurship as an *altruistic* form of entrepreneurship that "may be aimed to benefit society rather than merely maximizing individual profit" (p. 353). Hence, based on the definition by Tan et al. (2005) a social entrepreneur's mission can be driven by a combination of monetary *and* altruistic motivations. In contrast, Dees (1998) as well as Mair and Martí (2006) make more stringent distinctions and do not allow for mixed motive missions. In their perspective, the mission of commercial entrepreneurs is purely driven by monetary concerns, while social entrepreneurs are defined according to their regard for altruism. Dees (1998) constitutes the difference in the way entrepreneurs measure their *value creation.* For commercial entrepreneurs, the value of their work is determined by the monetary wealth they create, while social entrepreneurs measure it based on the created *social impact* (Dees, 1998). In line with this, Mair and Martí (2006) point out that "*rather than profit versus not-for profit […] the main difference between entrepreneurship in the business sector and social entrepreneurship lies in the relative priority given to social wealth creation versus economic wealth creation*" (Mair and Martí, 2006, p.39). While for social entrepreneurs, economic wealth creation may also present an important aspect, this is due to rather necessary means to an end (Dees, 1998; Mair and Martí, 2006; Dorado, 2006). While almost all authors see the pursuit of a social mission and the creation of social value at the core of social entrepreneurship (i.e., Peredo and McLean, 2006; Weerawardena and Mort, 2006), some authors propose that this social value should additionally be created in an innovative way (Dees, 1998; Austin et al., 2006; Zahra et al., 2009). To determine the

[12] Austin et al. (2006) theoretically derive four propositions concerning differences between social and commercial entrepreneurship. These propositions are based on the dimensions of (i.) markets, (ii.) mission, (iii.) performance measurement and (iv.) resources, whereby some interdependencies between these dimensions exist. With regards to (i.) markets, the authors claim commercial entrepreneurs to be continuously looking for new needs and break-troughs, while social entrepreneurs aim to serve existing, undersupplied needs (Austin et al., 2006). This could be the reason why social entrepreneurs often face a higher demand than they can serve, but, on the other hand, serve customers who do not have a high willingness or ability to pay (Mair, 2010).

meaning of the term *social mission*, several definitions of social entrepreneurship refer to a *double bottom line* (Dorado, 2006; Zahra et al., 2009) or a *triple bottom line* (Robinson, 2006) approach. This goes back to the work of Elkington (1994), who claims that businesses will not be successful unless they succeed to manage their triple bottom line consisting of *economic prosperity*, *social justice* and *environmental quality*. The *double bottom line* refers to the pursuit of both economic and social goals.

3.2.1.2. Social entrepreneurship: The profit vs. non-for-profit approach

Another interesting argument in the discussion of what distinguishes commercial to social entrepreneurship refers to whether social entrepreneurs can and should assume a *for-profit* business form or not. Thereby, many authors describe social entrepreneurship as a non-for-profit endeavor (see i.e., Peredo and McLean, 2006). Weerawardena and Mort (2006, p. 25) define social entrepreneurship as a "behavioral phenomenon expressed in a Not-for-Profit-Organization". Other researchers disagree and point out: *"Whether social entrepreneurs choose a not-for-profit or a for-profit vehicle often depends on the particular business model and the specific social needs addressed"* (Mair and Martí, 2006, p. 39). Others again allow for both types of business forms (Austin et al., 2006; Robinson, 2006).

Peredo and McLean (2006) discuss the difficulty of distinguishing between for-profit and non-for-profit companies by presenting prominent examples of for-profit social enterprises. Based on these observations, they identify five different stages of social entrepreneurship, depending on the relation between the social and commercial goals of a business (see Table A I, Appendix 6.2.). In their spectrum, social entrepreneurship reaches from the connection of primarily profit-making with some sub-ordinated social goals (termed "Cause Branding", e.g., the Avon breast cancer initiative) to the other extreme of exclusively pursuing social goals, without following any form of profit-making (e.g., NGOs). Dorado (2006) describes a similar, albeit narrower spectrum of social enterprises, distinguishing between three different forms namely (i.) non-profit social entrepreneurial ventures (SEVs), (ii.) for-profit SEVs and (iii.) cross-sector SEVs. Non-profit SEVs are defined as non-profit organizations pursuing social goals and adopting business models (Dorado, 2006). They differ from other entrepreneurial ventures by their governance structures because they do not pay taxes, have no owners and do not pay out dividends. These aspects also distinguish social non-profit SEVs from

for-profit SEVs which are "initiatives for whom social goals are central to their business model" (Dorado, 2006, p.324) and that share the same governance structures as traditional enterprises. The third form, (iii.) cross-sector SEVs are initiatives created only for a relatively short time period in order to serve a social cause. It is thereby not relevant whether this initiative makes a profit or not. A prominent example is the *Live Aid* concert, organized by Bob Geldof, with the purpose to raise donations for fighting the famine in Africa. Dorado (2006) critically discusses in particular the form of for-profit SEVs, referring to examples like Ben & Jerry's[13] and The Body Shop as "organizations that initially were for-profit SEVs but have increasingly deemphasized the centrality of their social goals" (Dorado, 2006, p. 325) and are therefore losing the status of a social enterprise. She points out that it would be important to delineate social entrepreneurship from socially corporate behavior. This raises the important question whether social entrepreneurship should be defined on the basis of *what* the business does or *how* the business does it?

Our paper follows the second approach, using CSR as the underlying criterion. However, in line with Dorado's (2006) argument, we do not allow for greenwashing in our experimental design, as we strictly analyze trade-offs (e.g., as soon as your monetary preferences dominate your social or ecological ones, you cannot classify as a social entrepreneur).

3.2.1.3. Social entrepreneurship based on the triple bottom line approach

Opposed to this view, Baron (2007) defines a social entrepreneur as someone who is prepared to form a CSR[14] venture even if this choice results in potential financial losses, hence sacrificing economic profitability for social purpose. In a similar manner, the Global Entrepreneurship Monitor (GEM) asked business owners, in the survey version of 2009, containing a special report on social entrepreneurship[15], to allocate a total of 100 points between the three categories of the triple bottom line, according to the goals of the

[13] In the model of Peredo and McLean (2006) Ben and Jerry's are classified in the fourth stage of the model.

[14] Definition of CSR in Baron (2007, p. 2): „practices that improve the workplace and benefit society in ways that go above and beyond what companies are legally required to do"

[15] In the GEM report itself "[…] social entrepreneurship is defined as individuals engaged in entrepreneurial activities with a social goal." (GEM report 2009, p. 7)

venture.[16] The report uses this measure in conjunction with two other measures, namely income strategy and innovativeness, in order to categorize social entrepreneurs into four different categories (i.) traditional NGOs, (ii.) not-for-profit social enterprises, (iii.) hybrid social enterprises, and (iv.) for-profit social enterprises (GEM Report, 2009).

In this paper, we follow a similar approach for defining commercial and social entrepreneurs. Instead of using the businesses' mission statements as a basis for distinction, it is the way in which entrepreneurs weigh off the three attributes of the triple bottom line, which defines our classification as a social or commercial entrepreneur:

Entrepreneurs whose preferences for leading their business in a social and ecological way dominate their monetary preferences, are classified as social entrepreneurs. Commercial entrepreneurs, on the other hand, are characterized by their dominating preference for monetary goals.

As in the definition of Baron (2007), in our definition it is consequently not about the core activity of the business but rather about the way in which the business is operated. The definition of this paper thus includes all five stages of the social-entrepreneurship-spectrum (see Table A I, Appendix 6.2.) of Peredo and McLean (2006). It is also in line with Tan et al. (2005, p. 364) who state:

> *"[…] we should not limit social entrepreneurship to organizations the sole objective of which is to benefit society. […] [T]here are instances of entrepreneurship that combine self-seeking enterprise with the social that a definition of social entrepreneurship limited to social purpose organizations would omit."*

As our research aims to answer the question whether *social entrepreneurs* operate *social businesses*, the next section carefully outlines literature deliberating the term social

[16] The exact wording is thereby as follows: „Organizations may have goals according to the ability to generate economic value, societal value and environmental value. Please allocate a total of 100 points across these three categories as it pertains to your goals."(GEM, 2009) This question is planned to be used again in the tier of the 2021 survey.

business and discusses as to how/whether the term can be distinguished from social entrepreneurship.

3.2.2. Social business as a special form of business

Like the concept of social entrepreneurship, the term social business is not clearly defined and both ideas tend to overlap (Beckmann et al., 2014). Muhammad Yunus coined and promoted the theory of social business, especially after he had won the Nobel Peace Prize in 2006 (Kreutzer and Mauksch, 2014). Yunus (2007, p. 22) defines a social business as:

> *"[...] a company that is cause-driven rather than profit-driven, with the potential to act as a change agent for the world. A social business is not charity. It is a business in every sense. It has to recover its full costs while achieving its social objective."*

Based on this definition, Grove and Berg (2014, p. 3) describe it as a business that "[…] promote[s] social objectives as primary, while also making a profit". According to Yunus, the core difference to a commercial business is that management and investors do not receive a share of the profit. Social businesses reinvest their profits in order to expand the company as well as the firm's social impact (Yunus, 2007).[17]

The question of how the concept of *social business* differs to the one of *social entrepreneurship* is intensively discussed in scientific literature (Beckmann et al., 2014). Most scholars agree that social entrepreneurship is an umbrella term which includes social businesses (Grove and Berg, 2014) or like Yunus formulates it: "Social business is a subset of social entrepreneurship. All those who design and run a social business are social entrepreneurs." (Yunus, 2007, p. 32). Beckmann et al. (2014) do not fully agree with Yunus' statement. They develop a framework to distinguish between a social business and social entrepreneurship based on three criteria: (i.) *the company's mission*, (ii.) *the origin of finance* and (iii.) *the degree of innovation* (Beckmann et al., 2014).

[17] The author makes one exemption for the case in which the owners belong to a socially disadvantaged group, because then the social benefit is created by the dividends and equity growth distributed to this group (Yunus, 2007).

According to their model, social businesses and social entrepreneurship have in common that they focus on a *social mission* but differ in the way this mission is achieved (Beckmann et al., 2014). Figure A I, Appendix 6.2., displays a matrix visualizing their idea.

The framework shows that *social entrepreneurship* is characterized by a high degree of *innovation* that in the sense of Schumpeter (1987) will lead to a new equilibrium (Beckmann et al., 2014). *Social businesses*, on the other hand, are not necessarily innovative, but operate in the private sector and generate their income on their own. According to the model by Beckman et al. (2014), companies which are innovative and fund themselves by market income belong in the domains of both social business and social entrepreneurship. If enterprises connect a social mission with financial self-sustainability but lack the innovative aspect (e.g., kindergartens) they classify as a social business, but not a form of social entrepreneurship. Companies pursuing a social mission and funding it by donations and public funds (not having financial self-sustainability) operate in the domain of social entrepreneurship, but are no social businesses. The authors emphasize that this matrix represents ideal types but that "empirical reality […] is rarely populated with ideal types of organizations" (Beckmann et al., 2014, p.32). Especially with regards to financial funds one can find hybrid forms, combining market income with funds from donations, or public sources, or use new forms like crowdfunding campaigns (Jansen et al., 2013).

3.2.3. Derivation of hypotheses based on literature

In this paper, *social business owners* are defined as those who *pursue a social mission in an innovative way and finance their business predominantly by market income*. Based on Beckmann et al. (2014) that addresses those entrepreneurs who are both a social business owner and a social entrepreneur. However, in this paper, we will exclusively use this definition in regards to defining *social businesses* as social entrepreneurs are exclusively defined via their preferences for operating a business, independent of their mission. Making the *social mission* of a venture the major underlying criterion for the definition of a *social business* (this holds also for the definition in this paper) as well as for the term *social entrepreneurship* (again, our definition removes this aspect, and exclusively considers the entrepreneur's preferences), suggests that commercial and

social business owners differ in regards to how they favor social value creation. Hence, we posit that *commercial and social business owners differ in their preferences.* To be more precise, we hypothesize that:

> *HYPOTHESIS 1: Social business owners prefer social and ecological outcomes over economic outcomes, while commercial business owners prefer economic outcomes over social and ecological outcomes.*

In other words, this translates into social entrepreneurs, based on this paper's definition, operating social businesses and vice versa for commercial entrepreneurs.

In his paper, Baron (2007) suggests that in addition to social value creation, the potential for feelings of warm glow may be a significant motivational driver for social entrepreneurs as they "sacrifice financial return but gain social satisfaction" (Baron, 2007, p.483). However, to the best of our knowledge, this has never been tested empirically. We will experimentally address the aspect of *warm glow theory*, which suggests that there is no pure form of altruism, since people receive a good feeling, a "warm glow", when they behave in an altruistic way (Andreoni, 1989; 1990), by evaluating how entrepreneurs value their reputation by others (which presents an important component of warm glow theory) and whether this systematically differs between social and commercial entrepreneurs. To be more precise, in addition to the attributes in relation to the triple bottom line, we create a fourth attribute in our experimental design, measuring the importance for being noticed by external parties in relation to their social behavior. Based on Baron (2007), we hypothesize that:

> *HYPOTHESIS 2: Social business owners have stronger preferences for being perceived by others for their sustainable behavior than commercial business owners.*

3.3. Methodology and Experimental Design

3.3.1. The method of conjoint analysis

To answer our research question and test the presented hypotheses we use the method of conjoint analysis. This approach was firstly proposed by Luce and Tukey

(1964) and has primarily found application in marketing and market research (Gustafsson et al., 2003), but has also been applied within entrepreneurship research (Lohrke et al., 2010) in order to analyze preferences of entrepreneurs (DeTienne et al., 2008), venture capitalists (Franke et al., 2006), and other stakeholders of new ventures (Choi and Shepherd, 2005).

Even if the name "conjoint analysis" suggests a specific method, the term actually stands for several different approaches to measure preferences for different attributes based on individual decisions concerning various profiles, so-called stimuli, consisting of different attribute levels (Gustafsson et al., 2003). The individuals are confronted with different attribute combinations and *con*sider them *joint*ly. From their judgment about the presented profiles, one can derive how much each attribute contributes to the individual's utility (Green and Tull, 1978). Green and Srinivasan (1978) describe six necessary steps to design, conduct, and evaluate a conjoint experiment. Thereby, the researcher has to choose relevant attributes and their respective levels. Besides *relevance* it is important that the attributes are *influenceable, realizable* and *independent* of each other. They should stand in a *compensatory relation,* and none of them should represent an *exclusion criterion*. Furthermore, the *number of attributes need to be limited*, so as not to overwhelm subjects with the range of potential choices. In this paper, we apply the full profile method, meaning that each stimulus represents a combination of all chosen attributes (Green and Tull, 1978; Green and Srinivasan, 1978). There are two ways for subjects to evaluate the presented stimuli – either by ranking or rating. In this experiment, the *ranking approach* was chosen, as this approach has been shown to reveal more clearly the differences in levels (Sayadi et al., 2005) and also in order to avoid inconsistencies in the evaluation. Based on the collected rank data, the part-worth utility values of each attribute level can then be estimated for each individual. The range of those values determines the relative importance of each attribute. The utility y of stimulus *k* can be calculated by the following formula:

$$y_k = \sum_{j=1}^{J} \sum_{m=1}^{M_j} \beta_{jm} \cdot x_{jmk} \qquad (1)$$

Thereby, y_k represents the estimated utility value of stimulus *k*, β_{jm} denotes the part-worth utilities for level m of attribute j, and x_{jmk} is a binary variable, which assumes the

value of 1, if stimulus *k* involves the level *m* of attribute *j*, and the value of 0, if it does not. Before calculating the part-worth utilities it can be useful to make assumptions about the relationship between attribute levels and the rank data. There are three possible forms: linear relation, negatively squared relation, and positively squared relation (Green and Srinivasan, 1978).[18] For the attributes chosen in our experiment only the linear relation will be relevant.

The following section outlines in detail the exact design of the conjoint experiment

3.3.2. Research design

With the aim to elicit and analyze preferences of social and commercial business owners, we created a decision scenario, in which subjects were asked to rank eight different *business models*. The models were thereby characterized by four different attributes*,* which will be outlined in more detail below. The experiment was conducted via an online-questionnaire using the online-platform *e-questionnaire* (the exact experimental design can be obtained from Figure A III to Figure A IX, Appendix 6.2.). Given entrepreneurs' busy lifestyle and their general lack of time regarding business unrelated matters, the online-questionnaire was deemed ideal, as it provided them with the opportunity to participate in the experiment at a time convenient for them. Before starting with the actual decision experiment, subjects were provided with a short introduction. Thereby, they were told to imagine founding a new business characterized by four different attributes. Next, they were familiarized with the task of *ranking eight* different business models according to their preferences. Thereby, the first rank represented the most preferred business model, while rank eight translated into the least preferred one. It was emphasized that there was no right or wrong answer.

On the following screen, the four relevant attributes were presented, namely *(1) income, (2) sourcing, (3) distribution,* and *(4) perception of the entrepreneur by the public*.

[18] A linear relation is the case if the preference increases (positive linear relation) or decreases (negative linear relation) with an increasing attribute level. A squared relation is assumed, if there is an optimal point for an attribute. The relation is negatively squared if a deviation from this point will result in lower preferences. In case of a positively squared relation a deviation from the optimal point will result in higher preferences.

1. *Income* represents the variable with the strongest *economic* focus. It was described to subjects as "*the profit of the business which could be used by the entrepreneur privately - after all necessary deductions for investment and taxes have been made*. Thereby, three different income levels were created: (i.) 1500 €/month, (ii.) 3000 €/month, and (iii.) 4500 €/month. These levels were derived from the income distribution of start-up founders given in the "KfW Gründungsmonitor 2013" (Metzger and Ullrich, 2013).
2. *Sourcing* presents the second attribute type and is characterized by two levels, namely *social* and *conventional* sourcing. It was described to subjects that the portrayed business has suppliers in foreign countries, in which the home country's social standards are not necessarily enforced. Therefore, the attribute level social comprised the formulation of a code of conduct, its enforcement and controlling among suppliers. In the case of conventional sourcing none of these steps would be taken. The description was based on the *Compass for Sustainability for small and medium-sized enterprises* (SMEs) (Gesellschaft für internationale Zusammenarbeit, 2014).[19]
3. The third attribute refers to the context of *distribution* and is characterized by two attribute levels, namely *ecological* and *conventional* distribution. Ecological distribution is described by measures like environment-friendly packaging, the delivery via trains rather than trucks, and business trips via trains rather than cars. These measures were derived from activity profiles provided by the members of the *Wirtschaft pro Klima* initiative, a group of 138 German companies taking and promoting measures to reduce CO2 emissions and protecting the environment (B.A.U.M. e.V., 2014). In the conventional case none of these measures would be taken.

The first three attributes represent the goals of a business according to the concept of the triple bottom line, namely (1) economic, (2) social, and (3) environmental goals.

4. The last attribute, *perception* was chosen to test warm-glow theory (Andreoni, 1989; 1990), as proposed by Baron (2007). It describes whether or not the entrepreneur's responsible behavior is perceived by society. The levels are

[19] This organization provides advice for SMEs concerning the implementation of sustainable supply chain.

binary: either the entrepreneur is recognized by society for her responsible doing (*yes*) or not (*no*).

In the experiment, it was emphasized that perception occurs independently of the fact, whether the business operates sustainable or not, in order to fulfill the attributes' *independence* assumption outlined in the previous section. Table 9 below summarizes the chosen attributes and their respective levels.

Table 9: Overview of attributes and attribute levels

Attributes	Attribute Levels
Income	1500 €/month (I_{1500})
	3000 €/month (I_{3000})
	4500 €/month (I_{4500})
Sourcing	Social (S_S)
	Conventional (S_C)
Distribution	Ecological (D_E)
	Conventional (D_C)
Perception	Yes (P_Y)
	No (P_N)

Based on the number of attributes and attribute levels, the creation of 24 (3x2x2x2) different business models would have been possible. To lower the decision complexity for subjects, the form of a reduced design with eight different business models was chosen. Those were designed by the orthogonal design procedure in the statistical computer software SPSS, resulting in the eight different stimuli presented in Table 10.

Table 10: Overview of eight business models used as stimuli

Business Model	Income	Sourcing	Distribution	Perception
A	3000 €/month	Conventional	Ecological	Yes
B	4500 €/month	Social	Ecological	No
C	1500 €/month	Social	Ecological	Yes
D	3000 €/month	Social	Conventional	No
E	1500 €/month	Conventional	Conventional	No
F	4500 €/month	Conventional	Conventional	Yes
G	1500 €/month	Social	Conventional	Yes
H	1500 €/month	Conventional	Ecological	No

After presenting all attributes and their respective levels, respondents were confronted with the eight stimuli (or business models) and given the task to rank them from 1 (most preferred) to 8 (least preferred). In order to facilitate a potentially easier ranking procedure, subjects had, prior to taking the actual online experiment, received hardcopy cards via mail and e-mail (for printing)[20], whereby each card presented one business model (stimuli). These cards were intended to enhance the visualization of the business models and to facilitate an easier ordering experience, by providing the opportunity to sort the models physically first.

Upon completing the conjoint decision task, subjects were asked to give some information about facts concerning their own business such as industry, legal form and number of employees with permanent working contracts. Furthermore, they were asked whether they consider their business a social business and if so, why. We also examined the motivation behind their decision to found a business – whether it was the aspiration to be an entrepreneur followed by the search for an idea/opportunity, or whether they had the idea/opportunity present itself first, which then resulted into the decision to found a business.

[20] The cards were sent out during the recruitment process. This will be described in more detail in the following section.

In the last part of the questionnaire, demographic data was requested. Subjects were assured that all provided data would be treated anonymously and in a confidential manner. The completion of the questionnaire required on average seventeen minutes.

3.3.3 Sample and data collection

The link to the questionnaire and the hardcopy cards were distributed to social and commercial business owners. For the group of *social business owners*, exclusively participants from the networks of *Ashoka Germany* and *Social Impact* were chosen for recruitment.[21] As outlined in the literature review, since there is no agreed-upon definition of the term *social business*, we decided to rely on the definitions of these two organizations, as a careful, rather conservative approach in this context was deemed crucial given our research question. Since Ashoka and Social Impact have been active *exclusively* in the domain of social entrepreneurship[22]/ business for several years, we could assure a clear delineation from social businesses to commercial ones. Both organizations support solely social, entrepreneurial ventures, based on their mission and its innovative character. From the potential sample we excluded organizations with the legal form of *"eingetragener Verein"* (e.V.), the German form of a registered association or foundation. This type of legal form is not allowed to pursue economic/for-profit activities (Weidmann and Kohlhepp, 2011), something we deemed essential as it ensured that only social businesses that primarily found themselves by market income were included, an essential component of a social business according to Beckmann et al. (2014). These criteria resulted in a potential sample size of 94 ventures (33 from the Ashoka database and 61 from Social Impact).

For each venture, one of the founders was contacted after having confirmed that she/he still manages the business. This process consisted of four steps: (1) First of all, the entrepreneurs received a personalized letter via mail that contained an invitation to

[21] Ashoka is the largest global association supporting social entrepreneurs by providing stipends, consulting and access to a global network of social entrepreneurs (Ashoka, 2013). It was founded in 1980 and operates offices in 36 countries. The German network was established in 2003 and has by now more than 50 fellows (Ashoka Germany, 2014). One of these fellows is Norbert Kunz – the founder of the Social Impact network that supports social businesses in their start-up phase (Ashoka Germany, 2014). Social Impact has offices in 7 cities in Germany, Austria and Switzerland and has assisted to realize numerous business formations (Social Impact, 2014a).

[22] Again, not necessarily in the sense of the social entrepreneurship definition of this paper.

participate in the experiment (including the link to the online questionnaire) as well as the eight hardcopy cards described in the previous section. (2) Several days later an e-mail followed with a similar invitation, the link and the cards in a digital version (again, each card summarized one stimuli or business model), with the aim to facilitate the way to the online-questionnaire. (3) The identical e-mail was also sent out separately by the organizations Ashoka and Social Impact, so as to increase the credibility of our experiment and consequently make potential subjects more likely to participate. (4) The last step was a reminding e-mail, send out two weeks later, containing again the link and a digital version of the stimuli cards. The exact four step procedure was applied for the group of commercial business owners.

Our goal was to construct the commercial business sample as comparable as possible to our social business sample concerning criteria like education, legal form, gender, company age and size. We decided to cooperate with *university-based incubators* for the recruitment of commercial business owners. Therefore, founders of firms from the incubators of Humboldt-University Berlin (Humboldt Innovation), Freie Universität Berlin (profund), and Martin-Luther-Universität Halle (univations Institute) were contacted. This resulted in a potential subject pool of 111 commercial, entrepreneurial business owners (51 of profund, 26 of Humboldt Innovation, and 34 of univations Institute). Ensuring that there were no social business owners among the commercial ones[23], we asked subjects in the questionnaire, whether they consider their company a social business. In case the answer was "yes", they were requested to give reasons for their assessment. While some commercial business owners classified their company as a social business, none of their reasons referred to the definition applied in this thesis (i.e., social mission or similar). Most of them indicated their use of *social media*, which illustrates once more how unclear the definition of a social business is.

The data was collected between the beginning of March and the middle of May 2014. In total 205 entrepreneurs were contacted of whom N=48 participated in the experiment (n=26 social business owners and n=22 commercial business owners). Three subjects had to be eliminated from the analysis, as they assigned the same rank number

[23] We additionally performed some screening of the commercial businesses, ensuring they do not classify as a social business, based on our working definitions.

twice, making an analysis via the conjoint method impossible. The data was evaluated using the statistical software SPSS. The results of our analysis are presented in the next section.

3.4. Empirical Analysis and Discussion of Findings

In this chapter, the results of the study will be presented. First, we describe the sample by using the demographic data of the subjects and data related to their businesses. In the second section, we present the results of the conjoint experiment, investigating whether commercial business owners differ from social business owners in relation to their preferences. In the following steps, a cluster analysis is applied to the data to find out whether entrepreneurs can be distinguished beyond the type of business they operate. Based on those results, the research question – *Do social entrepreneurs operate social businesses?* – will be answered. In the last section, an analysis of differences between social business owners and social entrepreneurs will follow. To avoid redundancies and to support the flow of reading the statistical results will be interpreted and discussed right away.

3.4.1. Descriptive statistics

The task of this paper is to compare our two groups of business owners in relation to their preferences in a quasi-experiment. To reduce disturbance variables and errors, we deemed it desirable to select these two groups as similar as possible concerning their owner and business characteristics. Consequently, we discuss in the following certain demographic variables in more detail to address this point. Table 11 shows the descriptive statistics of the respondents, accounting for *owner type*.

Table 11: Descriptive statistics of subjects

	Social business owners (n=23)	Commercial business owners (n=22)	Pooled data (n=45)
Female Ratio	35%	27%	31%
Mean Age	38 years	37 years	38 years
Religious	30%*	9%*	20%
Above-average social person (self-estimation)	83%	36%	60%

* p<0.1; ** p<0.05; *** p<0.01

Overall, there are fewer female subjects (31 percent) in the sample, which is not surprising given the underrepresentation of females in the vocation of entrepreneurship (i.e., the GEM female/male TEA ration for the year of 2014 was 0.61 (GEM 2014)). In the social business sample, slightly more women are represented, with a share of 35 percent compared to 27 percent in the commercial business group. This corresponds to the results of the GEM special issue report concerning social entrepreneurship from 2009 (Bosma and Levie, 2010), where the authors report a lower gender gap in the domain of social enterprises. The mean age of the sample is M=38 years, with an equal distribution across both samples. We also observe in relation to education similar levels for both business owner types. This can be obtained from Appendix 6.2., Graph A II. Finally, we observe a higher rate of social business owners being religious (M=30 percent) than their commercial counterparts (M=9 percent). A chi-squared test of difference reports this difference to be marginally significant (χ^2=3.202; p=0.074). Summarizing, the goal of similar group samples was realized for all described *owner characteristics* except for religion, implying that this variable could potentially be a driver for the decision to found a social business.

Next, we look at the *business characteristics*. The mean age of the pooled businesses is M=3 years, M=3.6 years for the commercial businesses, and M=2.2 years for the social ventures, hence both fulfilling the characteristics of an entrepreneurial firm in a fairly similar manner. Further, both social and commercial businesses have on average M=5 employees with permanent working contracts. Looking at the *industry sectors* the two venture groups operate in, we find the majority of ventures, both social and commercial, to operate in the *service sector* (M=65.22 percent commercial businesses; M=45.4 percent for social businesses). Further, while we see a very similar distribution within the *IT sector* (M≈20 percent), the proportion of social enterprises is nearly twice as high in the *product sector* (M=31.82 percent vs. M=17.39 percent). Also, in terms of the businesses' legal forms, we see a comparable distribution across both business types (see Graph A I, Appendix 6.2.).

The last question in the survey asked the entrepreneurs about their motivation for founding their businesses. The data in Table 12 shows that most business owners (pooled) first had a good idea and then decided to found a business (M=73 percent). Even if there are slightly more social than commercial business owners following that motivation, the

difference is not significant. We hence find on the majority of *business characteristics* very similar group samples.

Table 12: Descriptive statistics of the subjects' businesses

	Social businesses owners (n=23)	Commercial businesses owners (n=22)	Pooled data (n=45)
I had a good business idea - so I decided to found a business.	78%	68%	73%
I wanted to found a business -so I started looking for an idea.	22%	32%	27%

In the next section, we analyze any potential differences concerning the preferences of the two types of business owners.

3.4.2. Conjoint analysis: Average rankings of business scenarios

As described, conjoint analysis will be used to elicit entrepreneurs' preferences. Table 13 shows the average ranks of the eight companies (again, a ranking of 1 presents the most preferred business scenario and a rank of 8 the least preferred). The second column summarizes the description of the actual attribute levels for the respective business model. In the following columns, the average rank and their respective standard deviations are displayed for the social business owners, the commercial business owners, and the pooled sample.

Table 13: Ranking data of social and commercial business owners and the pooled sample

Business Model	Description	Social (n=23)			Commercial (n=22)			Pooled (n=45)	
		Aver. Rank	Std. dev.	Rank overall	Aver. Rank	Std. dev.	Rank overall	Aver. Rank	Std. dev.
A	I_{3000},S_C,D_E,P_Y	4,09	1,62	4	3,86	1,39	4	3,98	1,50
B	I_{4500},S_S,D_E,P_N	1,61	1,08	1	1,68	0,84	1	1,64	0,96
C	I_{1500},S_S,D_E,P_Y	2,65	1,50	2	3,45	1,90	3	3,04	1,73
D	I_{3000},S_S,D_C,P_N	3,83	1,70	3	3,36	-1,18	2	3,60	1,47
E	I_{1500},S_C,D_C,P_N	7,78	0,42	8	7,68	0,89	8	7,73	0,69
F	I_{4500},S_C,D_C,P_Y	5,74	1,60	6	4,77	2,53	5	5,27	2,14
G	I_{1500},S_S,D_C,P_Y	4,35	1,37	5	4,86	1,67	6	4,60	1,53
H	I_{1500},S_C,D_E,P_N	5,96	1,52	7	6,32	0,95	7	6,13	1,27

In both groups, company model B received on average the highest rank (M=1.64), followed by company C (M=3.04), and D (M=3.60). The only attribute level these three business scenarios have in common is social sourcing (S_S). The least preferred business model is company E (M=7.73), representing a combination of low income (I_L), both conventional sourcing (S_C) and distribution (D_C), and no perception of sustainable behavior by the public (P_N).[24] Ranking values are generally very similar for social and commercial business owners. The only ranking difference (by one rank) exists between company C and D, as well as between F and G.

The conjoint analysis produces two different data outputs relevant for data description: part-worth utilities and attribute importance values.

Table 14: Part-worth utilities of social and commercial business owners

Attribute	Attribute Levels	Part-worth utilities		*t*-test
		Social	*Commercial*	*p*-value
		(n=23)	*(n=22)*	
Income	1.500 €	0.798	1.248	0.159
	3.000 €	1.597	2.496	0.159
	4.500 €	2.395	3.744	0.158
Sourcing	Social	1.391	1.159	0.240
	Conventional	-1.391	-1.159	0.240
Distribution	Ecological	0.924	0.670	0.091
	Conventional	-0.924	-0.670	0.091
Perception	Yes	0.293	0.261	0.839
	No	-0.293	-0.261	0.839

Table 14 displays the part-worth utilities of social and commercial business owners for all attributes and their respective levels. Part-worth utilities present the preference for each specific attribute level included in a conjoint profile. Thereby, larger utility scores present a greater preference. Given the research question of the essay, we present the results for each sub-group of business owners separately, as this gives us an indication as to whether the preferences of social and commercial business owner differ in regards to business relevant characteristics. For commercial business owners, the income attribute (I) contributes (for all income levels), in relation to the social business owners, to higher utility levels. However, as can be obtained from the last column in Table 14, applying

[24] The low ranking of company profile E make sense as it represents a combination of low profits and rather unethical business practices.

independent sample t-tests this difference is statistically not significant (p=0.16). As became already apparent from the ranking of the business scenarios, both groups prefer social sourcing (S_S) to conventional sourcing (S_C). Social business owners attain only marginally (+ 0.232) more utility from this attribute than commercial business owners (p=0.24). The same holds for the attribute of distribution (D). Both groups prefer the ecological way (D_E) to the conventional (D_C) one, albeit this is more pronounced in the sample of social business owners. The different levels of part-worth utilities regarding this attribute are marginally significant (p=0.091). Finally, both groups prefer, to a very similar extent, situations in which others perceive their sustainable behavior (P_y), to a situation in which this is not perceived (P_N). However, overall this attribute is characterized by a low part-worth utility level (<0.3) for both groups. These results are not surprising, but show that entrepreneurs in general care for the topic of sustainable behavior and wish to be perceived as social.

The second output variable generated via conjoint analysis are attribute importance values, which measure the importance of each attribute to the overall preference.

Graph 1: Average relative importance values of commercial and social business owners

Graph 1 displays the average relative importance values of social and commercial business owners respectively.[25] The values are calculated based on the range of the

[25] Note, the average relative importance values add up to 100 percent. However, there are clearly other factors which drive entrepreneurs' utility which are not accounted for in our design.

respective part-worth utilities.[26] The higher the value, the more the attribute contributes to the individual's overall utility. Values are calculated for each individual and based on this an average value can be inferred for each group. The results show that commercial business owners have a higher preference for income than their social counterparts. For social business owners (social) sourcing (M=37.7 percent) is on average the most important attribute followed by income (M=26.3 percent) and distribution (M=25.5 percent). For commercial business owners it is the other way around: Income (M=34.2 percent) is on average slightly more important than sourcing (M=33.6 percent). Distribution also ranks third (M=19.4 percent) for the commercial business owners. For both groups, perception is the least important attribute, while interestingly commercial business owners (M=12.8 percent) assign on average slightly more importance to it than social business owners (M=10.5 percent). Ecological distribution and social sourcing are on average slightly more important for social than for commercial business owners. However, as can be obtained from the shapes in Graph 1, overall, the composition of the average importance values does not vary strongly[27].

These findings imply that *social business owners are, based on their preferences, not significantly more social than commercial business owners.* Analogous, *commercial business owners appear to be not significantly more monetarily-driven than social business owners*. Accordingly, our data does not support hypothesis 1.

This raises the question what else might drive people into founding a social business. Baron (2007) proposes that social entrepreneurs might be motivated by a "warm glow" (Andreoni, 1990). Therefore, *we hypothesized that social business owners hold a higher preference for being perceived by others for their sustainable behavior than commercial business owners* (hypothesis 2). However, our results (while not significant, p=0.51) actually show the opposite. The relative importance values for the attribute of perception are on average higher for commercial (M=12.8 percent) than for social business owners (M=10.5 percent). Consequently, our data does not support our second

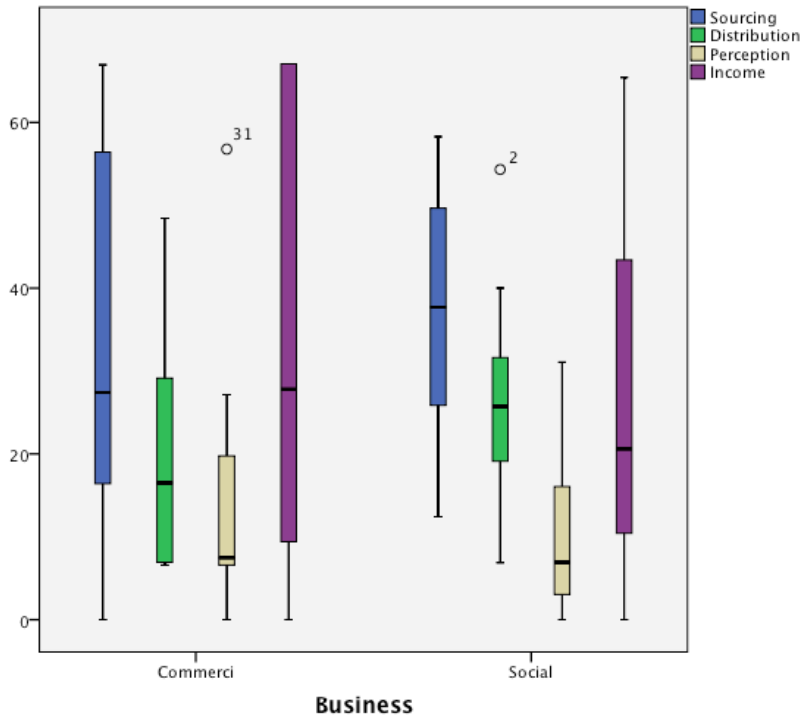
[27] Applying independent sample t-tests to the relative importance values of each attribute, we find no significant differences for three of the four attributes (see Table A II, Appendix 6.2.). Exclusively for the attribute of ecological distribution do we find social business owners to hold a marginally significantly higher preference in relation to the commercial business owners (p=0.098). These findings, are (unsurprisingly) in line with the findings of the part-worth utilities (Table 14).

hypothesis. One has to keep in mind that our sample size is rather small. The insignificant differences in the part-worth utilities of commercial and social business owners could be due to missing statistical power. However, another possibility could be that social and commercial business owners cannot be distinguished based on their preferences. We investigate this aspect further in the next section by analyzing the preference structures *within* both groups of business owners using cluster analysis.

3.4.3. Cluster analysis: Do social entrepreneurs operate social businesses?

In the previous section, it was shown that commercial and social business owners do not differ systematically in their preferences. Next, we take a closer look at the preferences *within* both groups. Figure 2 below displays a boxplot of the relative importance values for each attribute and each group of business owners.

Figure 2: Boxplot of the relative importance values of commercial and social business owners



For both types of owners, we can observe a wide range of values for the attributes of income and sourcing, implying that while some entrepreneurs highly value these

variables others do not at all.[28] This indicates that even if there are no significant differences between both groups, there may still be different preferences *within* the groups. Therefore, the method of *cluster analysis*[29] is used to assign subjects to different groups based on their *preferences*, rather than the definition of business type.

To cluster the data, we use the *Ward-Algorithm* (Ward, 1963), a hierarchical clustering method (i.e., Revelle, 1979) based on squared Euclidean distance. A hierarchical rather than non-hierarchical method (e.g. k-means) was chosen, as hierarchical cluster analysis assists in determining the optimal number of clusters (Jurowski and Reich, 2000). As relevant variables the *part-worth utilities* per individual were chosen. The dendrogram, presenting the results of the cluster analysis can be obtained in Figure A II, Appendix 6.2..[30]

The results of the cluster analysis are presented in Table 15 below. Two clusters of entrepreneurs are identified based on the part-worth utilities generated by the conjoint analysis – one consisting of 26 entrepreneurs, the other of 19 entrepreneurs. The last column displays the results of t-tests, conducted in order to analyze whether individual part-worth utilities differed significantly across the clusters. The results show that for all attributes, except for perception ($p = 0.491$), part-worth utilities differ significantly ($p < 0.001$) between cluster 1 and 2.[31] Graph 2 below displays the attribute importance values for each cluster respectively.

[28] The same argument can be observed when looking at the standard deviations of the relative importance values (see Table A III, Appendix 6.2.).

[29] The goal of this kind of analysis is to divide a sample into a certain number of sub-groups, which are very homogenous based on the chosen variables, but very heterogeneous when comparing them to each other (i.e., Revelle, 1979, Rokach and Maimon, 2005).

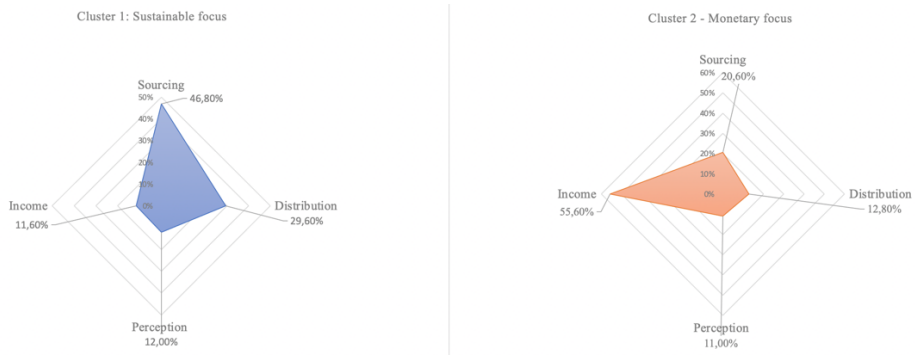
[30] Each number stands for one individual. On the vertical axis, it is specified whether the individual is a social or a commercial business owner.

[31] Independent samples t-test show that the two clusters also differ significantly for the *relative importance attributes* of income ($p<0.01$), sourcing ($p<0.01$) and distribution ($p<0.01$) (for statistics see Table A VI, Appendix 6.2.).

Table 15: Part-worth utilities for cluster 1 and cluster 2

Attribute	Attribute Levels	Part-worth utilities		
		Cluster 1 (social) (n=26)	*Cluster 2 (monetary) (n=19)*	t-tests *p*-value
Income	1.500 €	0.217	2.115	0.000
	3.000 €	0.434	4.230	0.000
	4.500 €	0.650	6.344	0.000
Sourcing	Social	1.635	0.789	0.000
	Conventional	-1.635	-0.798	0.000
Distribution	Ecological	1.038	0.474	0.000
	Conventional	-1.038	-0.474	0.000
Perception	Yes	0.327	0.211	0.491
	No	-0.327	-0.211	0.491

Graph 2: Average relative importance values by clusters (*N*=45)



The results show cluster 1 to be strongly *socially oriented*: social sourcing S_S (*M*=46.8 percent) as well as ecological distribution D_E (*M*=29.6 percent) represent the most important attributes. For subjects in cluster 1, income presents the least important attribute (*M*=11.5 percent). Cluster 2, on the other hand, displays strong *monetary orientations*. Income (*M*=55.6 percent) in this group of entrepreneurs represents by far the most important attribute. This is followed by social sourcing S_S (*M*=20.6 percent). Ecological distribution, D_E (*M*=12.8 percent) and a positive perception (*M*=11 percent) display rather low relative importance values. Results of the part-worth utilities and importance attributes for cluster 1 show that *social entrepreneurs*, according to the working definition of this paper exist, as their social and ecological preferences clearly

dominate their monetary ones. In cluster 2, on the other hand, entrepreneurs with a strong focus on monetary preferences can be observed.

Table 16 below depicts additional information about the two clusters: Via *t*- tests and Chi-squared tests (depending on data type) further analyses were conducted in order to assess whether any significant differences existed between these two clusters in terms of the type of businesses they operate, and their demographic variables.

Table 16:Cluster membership, business type, and demographic characteristics

	Entrepreneur (Cluster) Social (Cluster 1)	Money-driven (Cluster 2)		χ^2	*p* value
# of entrepreneurs	26	19			
commercial business owner	11 (42%)	11 (58%)			
social business owner	15 (58%)	8 (42%)		1.067	0.302
			t-value	χ^2	*p* value
Demographics (entrepreneur & business based)					
Mean Age Entrepreneur (yrs.)	39	36	1.054		0.298
Female ratio	42%	16%		3.602	0.058*
Religiosity	15%	26%		0.820	0.365
Mean Age Business (yrs.)	3	3	0.355		0.725
Employees	6	5	0.448		0.657
I wanted to found a business so I looked for a good business idea.	15%	42%		4.008	0.045**

Starting with the research question of this paper: namely whether *social entrepreneurs operate social businesses*, we explore what kind of *business owners* we observe in the respective cluster. In cluster 1, there are *n*=15 social business owners (58 percent) and *n*=11 commercial business owners (42 percent). Cluster 2 consists of *n*=8 social business owners (42 percent) and *n*=11 commercial business owners (58 percent).[32]As can be observed from Table 16, the results show no significant differences between social business and commercial business owners regarding their cluster

[32] See Table A IV, Appendix 6.2. for a summary of the results- for the two clusters (column 2 and 3) and presenting the characteristics of social business and commercial business owners (column 4 and 5).

allocation (χ^2= 1.067, p = 0.302). That is, we do not find significantly more social / commercial business owners in the socially / monetary driven cluster respectively.

Based on those results, the answer to the research question is: yes, social entrepreneurs do operate social businesses, but so do monetary-driven entrepreneurs, as we clearly observe monetary driven entrepreneurs (from cluster 2) to operate social businesses. On the other hand, there are also social entrepreneurs (from cluster 1) who operate commercial businesses.

> *Social business owners do not necessarily prefer social and ecological outcomes to monetary ones. And not all commercial business owners are predominantly driven by monetary preferences*.

We next discuss the results of the demographic variables: We assessed whether entrepreneur or business specific variables determine cluster membership. We find a marginally significant higher ratio of females in the social cluster relative to the commercial cluster (p = 0.058). Past research has argued females to be more ecologically and sustainably conscious than males (e.g., Shauki, 2011; Laroche et al., 2001), this could be a factor reflecting this finding.

Interestingly, we also observe a different motivation for founding a business across the social and commercial cluster. We find monetarily driven entrepreneurs to be significantly more likely to be motivated by the idea to found a business, and only as a consequence of that to be looking for a suitable business idea.[33].For the majority of entrepreneurs in the socially oriented cluster, on the other hand, the business idea came before there was necessarily a motivation to start a business ("*I had a good business idea so I decided to found a business.").* Given this finding, it could well be that in particular the entrepreneurs in the monetarily driven cluster found a *social* business, however not due to social preferences/motives, but rather due to an increasing market demand for social products and services. This is something future research should address in more detail.

[33] Looking at the sample of business owners (pre-clustering) no significant differences across groups on this variable was observed (see also Table 12)

Our findings consequently raise the question, whether the theoretical definitions of *social entrepreneurship* in the literature offer the best understandings as to what this type of entrepreneurship entails, and what not. *We argue that the mission-based approach fails to account how the venture is operated* (*how* that mission is pursued), while our findings suggest that this aspect might play an integral part in this discussion. Given our global environmental and societal problems, we propose that this aspect of *"how"* should not be ignored when defining the concept of social entrepreneurship. Rather, in line with the argument by Markman et al. (2016), it should comprise a central aspect within this discussion. Running a venture with a social mission, while at the same time producing a large ecological footprint (or similar), is insufficient and should not be classified as social entrepreneurship.

We are aware that deriving a justifiable delineation between social and commercial entrepreneurship is a complex and daunting task, but believe that our empirical findings in relation to the preferences of entrepreneurs might offer valuable insights for discussions and progress towards a viable methodology in this manner. Our experimental design did not collect variables that allow us to make statements, as to how business owners actually operate their business (i.e., whether in particular the commercial business owners in cluster 1 operate their business in an ecological, sustainable, and/or social way). Given our findings, this would have been valuable information, something future research should keep in mind.

In this context, we would like to raise the theory of *moral disengagement* (Bandura, 1991; Bandura et al.,1996). According to this theory, individuals cognitively disengage from their moral values when acting.[34] Hence, for our framework it would be interesting to observe, whether the *commercial business owners* observed in cluster 1 (characterized by strong environmental and social preferences) potentially *disengage* from their values when making business choices or evaluating business opportunities

[34] Interesting research in the field of entrepreneurship has been done by Shepherd, Patzelt and Baron (2013). The authors investigate conditions which might influence entrepreneurs to engage in moral disengagement during their decision-making, i.e., entrepreneurs who hold pro-environmental values but who pursue opportunities that will lead to outcomes inconsistent with these values. Their findings highlight the mediating role of entrepreneurial self-efficacy and industry munificence (Shepherd et al. 2013).

(i.e., by cognitively changing outcomes or actions so that they seem less inconsistent with their moral values, or by i.e., making others accountable for the negative social/environmental impact their actions cause). Again, we cannot, based on our data, make any inferences in this regard. However, moral disengagement certainly fails to explain why we observe *social business owners* in cluster 2 (described by monetary preferences). We invite future research to investigate this context further, as it is important to gain a better understanding regarding the different implications of our findings.

Having outlined and discussed our findings, we next outline potential limitations of this study, before we conclude.

3.5. Limitations

As with most empirical studies, ours also succumbs to certain limitations. First of all, the sample size of n=23 and n=22 for each business type is rather small, limiting generalizability. However, one needs to keep in mind that in particular in relation to the classification criteria for our *social business sample* (based solely on Ashoka and Social Impact firms), we ran a very conservative, clear-cut approach, highlighting the *quality* of our data. Our results are somewhat limited to very young companies, since for both groups the average business age is M=3 years. For future research, it would hence be desirable to conduct this experiment with a larger sample and an extended geographical and firm maturity focus in order to increase the study's external validity.

Also, this study might potentially have a short-coming relating to internal validity, arising from a *self-selection bias.* Possibly subjects willing to participate in an experiment like ours are generally more social than those who do not. A further concern could stem from *demand effects*. One might argue that subjects did not rank the presented business scenarios according to their preference structure but rather responded in a way they believed to be *socially desirable* (i.e., falsely stating to hold social and ecological preferences) – in particular as the experiment was not designed in an incentive compatible way. However, both Lohrke et al. (2010) and Shepherd and Zacharakis (1997) report the advantage of using conjoint analysis in order to reduce not only *social desirability bias* but also *retrospective reporting biases*.

The method of conjoint analysis itself however raises some limitations. One has to be aware that it is a static, steady-state measurement method (Green and Krieger, 1991). Therefore, the preferences measured in this experiment may be valid for the time being but may change over time, for instance, during different phases of the entrepreneurial process. It hence seems valuable to extend this cross-sectional data by a time-series analysis. The resulting panel data could provide new insights concerning entrepreneurial preferences over time. Also, critics of this method may put forward that experiments such as conjoint analysis fail to reflect "real life" situations and consequently do not elicit "real" responses. We would like to stress the advantages of using experimentally generated data, based on the controlled environment in which this data is generated, allowing for the establishment of causal relationships while minimizing the risk of confounding factors (Schade and Burmeister-Lamp, 2009).

Nevertheless, the results of this paper contribute in various ways to social entrepreneurship research. It is shown that the purely mission-based definition does not provide a complete picture of the phenomenon, as it fails to include entrepreneurs who are characterized by social preferences. It might be reasonable to shift the perspective and integrate the preferences of an entrepreneur when describing the concept.

3.6. Conclusion

We empirically investigated whether social entrepreneurs operate social businesses. Thereby, we defined a social entrepreneur purely based on her or his preferences – which we experimentally elicited via a conjoint design – and independently of the business type (social or commercial) she or he operates. Thereby, a social entrepreneur was defined as someone whose preferences for leading their businesses in a social and ecological way dominate their monetary preferences.

That means, based on our design a social entrepreneur can also operate a commercial business, and vice versa a commercial or monetary-driven entrepreneur can operate a social business. Our data revealed that these two different kinds of entrepreneurs, based on our definition actually exist.

Table 17: Sample distribution according to business & entrepreneurial type

		Preferences of the entrepreneur	
		social / ecologically driven	monetarily driven
Mission-based Approach	Social Business	33%	18%
	Commercial Business	24%	24%

The matrix in Table 17 displays the distribution of the sample according to business and entrepreneurial types. Based on the presented data, the answer to the research question is ambiguous: yes, social entrepreneurs do operate social businesses, but not exclusively. They also operate commercial businesses. Furthermore, there are also monetary-driven entrepreneurs who operate social businesses. Since both types of entrepreneurs run both types of businesses, no systematic difference between social and commercial business owners could be found. Based on former social entrepreneurship theory, which almost exclusively assumes the mission-based definition, it was hypothesized that there is a systematic difference between social and commercial business owners concerning their preferences. The academic literature suggests that commercial business owners have stronger preferences for monetary outcomes, while social business owners prefer social and ecological outcomes. Therefore, the empirical findings do not correspond to the current literature view and the mission-based definition.

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4. ESSAY NO. III

Cooperation and altruism in incentive compatible experiments with entrepreneurs, professionals, and business students.

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A central question in entrepreneurship research is: Who is the entrepreneur? In the past, the field has focused on the role of environmental conditions (Gartner, 1988), psychological traits (e.g., Rauch and Freese, 2006; Koellinger et al., 2007; 2013) and behavioral aspects (e.g, Busenitz and Barney, 1997). However, studies measuring entrepreneurs' social preferences (Weitzel et al., 2010; Urbig et al., 2012) and/or their willingness to cooperate are scarce, despite the fact that these two aspects are likely to considerably impact entrepreneurs' decision-making. Moreover, the manifestations of these factors are likely to have implications not only for the internal and external stakeholders of ventures but ultimately for our society in general. We empirically investigate altruistic and cooperative tendencies of actual entrepreneurs using game-theoretic concepts and analyze whether the behavior of entrepreneurs in these games significantly differs from the behavior of other professionals, as well as business and economic students. We find entrepreneurs to be more altruistic than business and economics students. We further find entrepreneurs to show stronger cooperative tendencies than other professionals working within the start-up industry, as well as business and economics students. We discuss the resulting implications for an entrepreneurial context as well as for society. Our findings also offer some interesting considerations for experimental decision-making studies.

4.1. Introduction

This paper is about actual cooperative and altruistic tendencies of entrepreneurs. Both tendencies are under-researched and yet very important for both the academic and applied field of entrepreneurship. We address this gap in the literature via established economic experiments: dictator (Kahneman, 1985; Forsythe et al., 1994) and public goods games (Ledyard, 1995) with real payoffs, run with entrepreneurs, non-entrepreneur professionals and economic and business students.

In general, the entrepreneurial environment is characterized by substantial uncertainty (Knight, 1921), high asset specificity, and a rather underdeveloped level of infrastructure, often due to the fact that new ventures are innovative (Williamson, 1995; Schumpeter, 1987). The complexity of this environment makes it important to cooperate with other team members of the venture, capital providers, suppliers, regulators, customers, employers and perhaps even competitors. At the same time, such an environment opens possibilities for unproductive rent seeking and destructive venturing (Baumol, 1990). In the literature, we find some theory development on cooperative behavior of entrepreneurs for an entrepreneurial context. Cable and Shane (1997) describe and theoretically model, using the framework of a social dilemma, the importance of cooperation between entrepreneurs and venture finance providers. Maintaining a cooperative climate with capital providers or any of the other aforementioned stakeholders involves a willingness to share and cooperate, even at the potential cost of personal short run gains. While research has established networks to play an essential role for entrepreneurial success (Witt, 2004; Greve et al., 2003), to the best of our knowledge, there is no study empirically investigating cooperative tendencies of entrepreneurs, using game theoretic concepts.

An even more pronounced form of other-regarding preference is altruism. It can be debated, whether altruism is an appropriate topic for an economic analysis of entrepreneurship.

The reason goes way back to Adam Smith's ([1776] 1910, p.13) famous analysis:

> *"It is not from the benevolence of the butcher, the brewer, or the baker, that we expect our dinner, but from their regard to their own interest. We address ourselves, not to their humanity, but to their self-love, and never talk to them of our own necessities but of their advantages."*

In this respect, Baumol (1990) stresses the importance of institutions to constrain potentially unproductive or even destructive behavior of selfish entrepreneurs. This would suggest altruism to be irrelevant for generating a positive effect of entrepreneurship for society. However, we believe there might be a plethora of social business opportunities that are beneficial for society but can only be run by altruistic entrepreneurs because they derive additional utility from helping others (Leadbeater, 1997).

This study contributes to the literature by empirically investigating sharing and cooperative tendencies of actual entrepreneurs using game-theoretic concepts and discussing the resulting implications for an entrepreneurial context. This is done by comparing the game-behavior of entrepreneurs to that of non-entrepreneurs. As about 50 percent of our subject pool is drawn from a non-student population, we achieve a better representation of the general population (in particular relevant for a business context).

Our results show that entrepreneurs, with several nuances that can be made, are indeed more willing to share and cooperate than professionals and, importantly, than economics and business students. Our finding is independent of social entrepreneurship, suggesting that entrepreneurship is not only about doing well for oneself, but also about doing well for society.

The paper is structured as follows: the next section describes briefly the theoretical background of other-regarding preferences and outlines our motivation for eliciting these types of preferences in the context of entrepreneurship. Thereby, the games applied are portrayed in more detail. Section 3 describes our sample and our recruitment procedure for all three groups. In section 4, we outline the experimental design. Section 5 presents and analyses the results, which are then discussed in section 6. Section 7 considers the study's limitations, before we briefly conclude in section 8.

4.2. Theory and Hypotheses

4.2.1. Other-regarding preferences

In order to investigate entrepreneurs' positive[35] *other-regarding preferences* (ORP), we make use of game theoretic concepts, which allow us to closely study altruistic and cooperative tendencies, by contrasting actual behavior to the predictions of behavior under the assumption of narrowly self-interested preferences and unboundedly rational behavior (Simon, 1955). The theory of ORP assumes utility functions to incorporate the outcomes or consequences of other people (generally their monetary payoff) to some dimension. Past research has made extensive use of experiments in this regard (e.g., Fehr and Schmidt, 1999; Bolton and Ockenfels, 2000; Andreoni and Miller, 2002), and findings clearly demonstrate that people generally do care about the outcome of others. To the best of our knowledge, we are the first to show how actual entrepreneurs compare in this regard.

Thereby, most of the models developed in this context are based to some extent on the concept of fairness.[36] As will be outlined in more detail in the following sections, we make use of two classic games for capturing the preferences of interest to us: In order to assess altruistic vs. self-interested behavior, we let subjects play a simple, one shot (static) *dictator game*. This type of game is often also referred to as a measure of *unconditional kindness* (Ben-Ner and Halldorsson, 2010). For measuring cooperative tendencies, we apply a *dynamic voluntary contribution game*. Dynamic or iterated games are played over time (i.e., over several rounds or periods) and allow players to develop ongoing relationships (Aumann and Hart, 1992), as choices made in each period, do not only affect the payoff of the current period, but also influence future interactions of the players. Further, by providing feedback or information to the players during an iterated game, i.e., about the behavior of the counterparty, subjects may learn and potentially adjust their strategies (Fudenberg et al., 1998). The rational, game-theoretic equilibria in repeated games are determined by *backward induction*. This implies anticipating the behavior of

[35] That is, weighing the welfare of others positively within their own utility.

[36] The literature distinguishes between different types of ORP: (1) *distributive* ORP (Bolten, 1991; Bolton and Ockenfels, 2000; Fehr and Schmidt, 1999), (2) *reciprocal* ORP (Fehr et al., 1993; Berg et al., 1995), (3*) both distributive and reciprocal* ORP (e.g., Bolton and Ockenfels, 2000; Charness and Rabin, 2002; Dufwenberg and Kirchsteiger, 2004).

the counterparty based on their behavior in the last round of the game and to adjust one's own behavior according to this expectation. This process is repeated iteratively for the second to last round and so on, until the first round of the game is reached (Camerer, 1997).[37]

The *voluntary contribution game* in this paper presents a *social dilemma*. Social dilemma games are characterized by a *Pareto deficient equilibrium*, and off-equilibrium behavior within these games is generally interpreted as *cooperative* behavior, as cooperation within the context of these games increases efficiency as well as overall welfare (Camerer, 2011). Hence, immediate self-interest in these games conflicts with social efficiency, as is the case in many real-world situations, including business contexts. While both parties benefit from cooperation, defecting cooperation (also termed *free-riding*) remains the *dominant strategy* for every individual in these games.

4.2.2. Social preferences in an entrepreneurial context

We argue that understanding how fair entrepreneurs are, or to what degree they behave altruistic and cooperative, offers valuable information, for at least two reasons:

First, past studies have shown that there is a positive link between pro-sociality and certain business-related factors, such as earnings (Bowles et al., 2001) and productivity (Barr and Serneels, 2009; Carpenter and Seki, 2011), which hold also outside the laboratory (lab-in-the-field experiments). For example, Leibbrandt (2012) shows that sellers, who act more pro-social in laboratory experiments, also realize higher returns for their products than their more selfish counterparts. It hence appears that pro-social preferences positively impact certain business performance measures. Thereby, different suggestions regarding the mechanism by which this occurs have been offered. One suggestion is that individuals with more pronounced social preferences are less inclined to behave opportunistically, for example with their stakeholders, and consequently realize reputational benefits (Bowles et al., 2001). Others suggest that pro-social individuals are generally better at interacting and can consequently more strongly benefit from certain network effects (Barr and Serneels, 2009).

[37] Strategies that take into account the whole sequence of periods are termed 'super game', while each period and its adjunct previous/following period is termed a sub-game.

While pro-sociality has been considered in a range of labor economic contexts (see i.e., Charness and Villeval, 2009; Fehr and Leibbrandt, 2011; Gneezy et al., 2016), there is surprisingly little empirical research investigating pro-sociality in the context of entrepreneurship. However, we argue that the role of social preferences might play in particular in the uncertain, volatile, and often asset specific environment of entrepreneurs a central role, as these environmental characteristics might create *social norms*, fostering higher levels of cooperation. We will outline this in more detail in section 4.2.2.2..

The second reason for studying social preferences of entrepreneurs relates to the produced insights in relation to their direct impact on society in general. Entrepreneurship is generally regarded as something which positively impacts our civilization, in particular by generating economic growth via i.e., employment generation and innovation (Van Praag and Versloot, 2007). However, Baumol (1990) critically discusses the potential for entrepreneurs to engage in unproductive or even destructive activities. We argue that this potential has even increased given the great levels of wealth inequality (Zucman, 2019), as well as the environmental and sustainability problems on our planet.

Ostrom (2010) discusses how many of our current environmental issues resemble the situation of a social dilemma. The findings of studies investigating this link in more detail, suggest social preferences to indeed play a role in the conservation/exploitation of resources. Fehr and Leibbrandt (2011) for example study how other-regarding preferences effect the exploitation of common pool resources. The authors find fishermen, who demonstrate stronger cooperative tendencies in the laboratory (measured via a public good game game) to be less likely to exploit their fishing grounds (Fehr and Leibbrandt, 2011). Riedl and Smeets (2017) find that social preferences have a significantly positive impact on socially responsible investment decisions, even if that decision leads to lower financial returns. Knez (2016) reports altruistic individuals to show a greater willingness to make sacrifices in order to protect the environment. Hence, ORP appear to play a role for responsible and sustainable economic decision-making.

In the following section, we review studies which have empirically studied altruistic tendencies in an entrepreneurial context and describe the theoretical background of the methods used in this context.

4.2.2.1. Altruism in an entrepreneurial context

Incentivized experiments concerning entrepreneurs' social preferences appear scarce in the literature. Notable exceptions present thereby the studies by Weitzel et al. (2010) and Urbig et al. (2012).

Weitzel et al. (2010) experimentally investigate selfish behaviors of *entrepreneurially talented*[38] students by analyzing allocation choices across various forms of dictator games. The authors find subjects' beliefs regarding their own *creative* and *business skills* (relative to their peers) to play a significant moderating role in this context, leading to systematic differences in their findings. Subjects who demonstrate a combination of *high business-related skills* and *low creative skills*, donate significantly less money in the dictator game. Taking their finding into account, we control for *entrepreneurial self-efficacy* in our experimental design. Moreover, we partially reproduce their design, and expand it with a standard public good game, in order to be able to test for the importance of strategic interactions (see section 4.2.2.2.) using actual entrepreneurs, professionals, as well as students as subjects. Urbig et al. (2012) complement the study by Weitzel et al. (2010). The authors investigate how student subjects with *entrepreneurial intent* exploit risky investment opportunities with positive and negative externalities. They find subjects with high levels of entrepreneurial intent to invest significantly *less* into destructive scenarios, suggesting that students who intend to become an entrepreneur exhibit higher levels of ORP than others. In their experimental design, Urbig et al. (2012) control also for *entrepreneurial talent* (self-efficacy) and find, in line with Weitzel et al. (2010), individuals with high business-related skills to invest significantly more into the destructive scenarios.

Taking these results together, it appears that entrepreneurial intentions as well as creative talent positively impact social preferences, while (self-reported) business talent appears to drive rather less socially oriented choices.

[38] Entrepreneurial talent in their study is measured by the scale of *entrepreneurial self-efficacy*, which the authors further differentiate into the sub-scales of (1) business and (2) creative talent.

Our first contribution to this emerging literature consists in implementing a similar experimental game set-up, with a subject pool of actual entrepreneurs and to investigate whether their preference structure differs from those of non-entrepreneurs.

To test for the preferences of altruism and fairness, we follow the approach by Weitzel et al. (2010), making use of the *standard dictator game* (Kahneman et al., 1986; Forsythe et al., 1994) in our experimental design. In the classic dictator game, originally invented to test the income maximization assumption, there are two players: the dictator and the recipient. The dictator, endowed with a sum of money, decides how much of her endowment she is willing to allocate to the recipient, who simply has to accept the offer.[39] Standard behavioral assumptions in economic theory would predict the dictator to make zero allocations, as this strategy maximizes her private returns. However, past research, and there is a lot of it, has shown that most dictators deviate from this strategy and do allocate some of their endowment to the recipient. A review of the empirical evidence shows that average endowment transfers to the recipient range between around 27 percent and 38 percent in Western and indigenous cultures and to further vary significantly over time and space within these groups (Engel, 2010).

Cultural and societal characteristics have been shown to play a critical role for contribution levels (see e.g., Henrich et al., 2000). Thereby, it has been suggested that these observed differences in ORP across countries and cultures might, at least partially, be driven by different *social norms*. This might play a role when studying the context of entrepreneurship. Fehr and Fischbacher (2004, p. 63) define social norms as "[…] normative standards of behavior that are enforced by informal social sanctions." These sanctions might be in the form of, e.g., shame or punishment and are generally adopted via social learning mechanisms. Ultimately, they can cause a lasting change in an individual's motivation to act pro-social or not (Fehr and Gächter, 2002; Fehr and Fischbacher, 2004). Empirical studies further indicate a link between social norms and *societal conditions*, whereby the latter is said to influence the former (Gächter and

[39] It is important to note that the recipient's role in this game is completely passive, i.e., she cannot object the allocation decision of the dictator (as in the ultimatum game). Moreover, both the dictator and the recipient are anonymous and randomly assigned to the respective roles. Consequently, strictly speaking, since any strategic component or risk is missing, the dictator game does not really qualify as a game but an allocation task.

Herrmann, 2011; Henrich et al., 2005). The workplace constitutes such a societal condition (Gneezy et al., 2016), and hence the social norms prevailing in an entrepreneurial work environment might lead to certain social norms in regards to altruistic and cooperative behaviors.

Concepts used to explain the behavior in the dictator game range from the notion of fairness and altruism to inequity aversion (e.g., Kahneman et al., 1986; Rabin, 1993; Fehr and Schmidt, 1999; List, 2007). For a discussion on this, see for example Fehr and Schmidt (2010). For our research, it is mainly important to note that the caring behavior, measured in this game, is a form of *unconditional* kindness and hence unrelated to the concept of reciprocity (Fehr and Gächter, 1999) or strategic interaction, which we investigate separately in our experiment, and outline in more detail in the next section (4.2.2.2).

Based on the results by Urbig et al. (2012), namely that students with higher levels of entrepreneurial intent demonstrate stronger social concerns, we formulate our hypotheses in relation to altruism as follows:

HYPOTHESIS 1: When playing in the role of the dictator, we expect entrepreneurs to allocate more funds to the recipient than the other two natural groups in our sample (students and start-up employees, collaborators, and investors).

However, we treat this part of our study rather exploratively, in particular as the current state of research provides somewhat contradictory findings in relation to entrepreneurial intent and self-efficacy. We control for self-efficacy within our sample so as to gain more insights in this regard. The main goal of studying altruism in our experiment is to gain a better understanding as to whether and how this social preference differs between entrepreneurs and others.

In our experiment, we asked entrepreneurs to indicate how social they would describe one or more of their businesses (see section 4.7. for more details on this). Based on the previously described findings in relation to social preferences, sustainable, as well as responsible behaviors (i.e., Urbig et al., 2012; Fehr and Leibbrandt, 2011; Riedl and Smeets, 2017; Knez, 2016), we posit our second hypothesis:

HYPOTHESIS 2: Within the group of entrepreneurs, we expect a positive association between the venture's level of social operations and the entrepreneur's own altruistic tendencies.

Next, we outline the second social preference measure elicited in our experimental design, the willingness to *cooperate.* Thereby, we describe its importance within the entrepreneurial context and consequently derive our resulting hypothesis.

4.2.2.2. Cooperation in an entrepreneurial context

We know the importance for firms to build strong and trusting relationships with relevant stakeholders from *stakeholder theory* (Barringer and Harrison, 2000). These types of relationships are especially important in the context of entrepreneurship: Faced with major resource constraints, entrepreneurs need to develop strategic relationships to successfully found and grow their ventures (Maxwell and Levesque, 2014; Pollack and Bosse, 2014; Shepherd and Zacharakis, 2001). Moreover, entrepreneurs generally need to initiate and build most of these relationships themselves and from the ground up. New ventures, by definition, lack a record of accomplishment, while at the same time engaging in innovative and risky activities. Pollack et al. (2017) suggest that this might induce behaviors and decision-making processes not captured by general stakeholder theory. For example, research in the field of entrepreneurial finance has shown the reliance on reciprocal, cooperative relations and social control mechanisms, like trust, to be potentially more important than standard formal control mechanisms, such as instigating the investors on the board of directors (Sapienza and Korsgaard, 1996; De Clercq and Sapienza, 2001, 2006).

Entrepreneurial environments are characterized by high risk and uncertainty (Knight, 1921), information asymmetries (Dutta and Folta, 2015) and oftentimes misaligned interests (Cable and Shane, 1997). All circumstances, which offer a viable environment for opportunistic behavior, even more so as the given context does not allow for the design of complete and enforceable contracts (Williamson, 1985; Cable and Shane, 1997; Hellman, 2007). As a result, *social norms*, on which cooperation is mainly based (Fehr, 2004), appear to be particularly relevant in the entrepreneurial environment, as they might help the actors to overcome fear of opportunistic behavior, and even

facilitate the possibility of inaugurating qualitative and long-term relationships, so important for risk reduction[40] and venture success (Mayer et al., 1995; Howorth and Moro, 2006; Schoorman et al., 2007; Welter and Smallbone, 2006; Larson, 1991; Parkhe, 1993).

As described in section 4.2.2., the social norms of an environment, such as the workplace, play a decisive role for different manifestations of pro-social behaviors. Gneezy et al. (2016) for example find significantly different cooperative behaviors between fishermen on lakes and fisherman on the sea, based on the different norms of cooperation in these two environments. Suarez-Villa (1998) shows that entrepreneurial firms engage in significantly more cooperative strategies than their larger, more mature counterparts. Also, based on the positive link between pro-sociality and certain business-related factors, i.e., earnings (Bowles et al., 2001) and productivity (Barr and Serneels, 2009, Carpenter and Seki, 2011), it appears that the ability and willingness to cooperate should therefore present in particular for entrepreneurs an important asset. To be more precise, we argue that the specificity of the entrepreneurial environment inaugurates social norms, which cause entrepreneurs to adapt more pro-social behavioral strategies which consequently lead to higher levels of cooperation.

HYPOTHESIS 3: We expect to observe a stronger tendency of entrepreneurs to cooperate in the public good game in relation to students as well as start-up employees, collaborators, and investors.

We investigate cooperative behaviors of entrepreneurs by using a *dynamic voluntary contribution mechanism*, called a *standard public good game* (Ledyard, 1995), in our case with two players.[41] Dilemma games, such as the public good game, are generally used for modelling and studying interactive and strategic behaviors of individuals. The game's set-up is as follows: At the beginning of the game, each player, i=1, 2, is given a certain monetary endowment. The players then simultaneously decide how much of their endowment they want to invest into the creation of a public good or

[40] Thereby, referring to the reduction of performance risk not relational risk.

[41] We apply *non-cooperative game-theory*, entailing only situations in which contracts or arrangements are not binding or enforceable, resembling the entrepreneurial environment.

project.[42] The individual's monetary payoff π_i strategically depends on the actions of the counterparty and is defined by the following payoff function:

$$\pi_i(g_1, g_2) = endowment - g_i + \alpha(g_1 + g_2)$$

Thereby, g_i denotes player $i's$ contribution to the project. The production function of the project is given by the sum of both players contribution to the public good ($g_1 + g_2$). The marginal per capita return of investing into the project is given by α. Since the game is designed as a social dilemma game, it has to hold that $1/n < \alpha < 1$.[43] Based on this condition, whatever the contribution of the opponent, the marginal cost of investing (equal to one) is higher than the marginal return of investing, and the dominant strategy for both players would be not to invest any endowment to the project ($g_1 = g_2 = 0$). The Nash equilibrium payoff is therefore defined by $\pi_i^{NE} = endowment$. However, since the joint marginal return ($n * \alpha$) is *higher* than the cost of investing, the Pareto efficient outcome is characterized by both players contributing their entire endowment to the project. In that case, the payoffs to both players is given by:

$$\pi_i(g_1, g_2) = 1.4 * endowment$$

The game has been applied extensively within experimental economics to study whether individuals play the self-interested Nash solution, or act cooperatively by contributing to the project. Playing the game in an iterated version further allows us to measure subjects' levels of conditional cooperation or reciprocity.[44]

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[42] The project in our experimental instructions was not framed or specified further. It was just called "the project".

[43] In our experimental design α was set at α=0.7.

[44] An important technical distinction needs to be made between reciprocity and cooperative behavior. While the former is described as responsive behavior to the previous actions of the counterparty regardless of potential future material gains/losses, cooperative behavior is rather in direct relation to these future potential payoffs (Fehr and Gächter, 2000). The willingness to contribute to the project because other players are also contributing describes the notion of *positive reciprocity*. *Negative reciprocity* arises when an individual, who contributed to the project in the previous round of the game (t-1), while the counterparty contributed nothing or significantly less (free-rode), decides in the current round (t) of the game to penalize the counterparty for this behavior by contributing significantly less (or zero) to the project (tit-for-tat). This means that after several rounds of the game, the behavior of free-riders and (negative) reciprocators is indistinguishable when considering their contribution levels in the current round only. The same holds for (positive) reciprocators and players who always play a cooperative strategy. In game theory, it has been shown that variations of a tit-for-tat strategy in (infinitely repeated or open ended) games can sustain cooperation even among self-interested individuals (Axelrod, 2006). That is, cooperation does not need to

Having outlined our motivation for eliciting social preferences in the context of entrepreneurship and the relevant theoretical and empirical background, we next describe our approach for implementation and experimental design.

4.3. Recruitment Procedure

4.3.1. Entrepreneurs and professionals

The data collection of the entrepreneurs and 'professionals' sample was conducted via lab-in-the-field experiments at two different entrepreneurship conferences in Hamburg and Berlin. Both conferences are characterized by a strong focus on technology and innovation – particularly in relation to digitalization. The first four experimental sessions were conducted at the *European Conference on the Future Internet* (ECFI) in Hamburg in November 2015. More than 1000 international guests participated at the conference. The crowd consisted of entrepreneurs, venture capitalists, business angels, accelerators, scientists and other individuals engaged or interested in the start-up and technology industry. The conference provided numerous workshops (e.g., hackathons), lectures, pitching competitions, and networking opportunities.

An additional four sessions were conducted at the *Tech Open Air* (TOA) in Berlin, one of Europe's leading interdisciplinary technology festivals. The festival is a well-known technology conference (founded in 2012) in and out of Europe.[45] At TOA a large number of entrepreneurs, investors and start-ups (predominantly from the digital and high technology industry) come together, with the aim of generating a platform for multidisciplinary knowledge exchange and development. The conference's program includes speeches, pitches and various workshops, again catered towards an entrepreneurial and professional crowd.

be the manifestation of ORP, but it has been shown that the cooperative equilibrium is much easier to reach and sustain when ORP and some altruism is present (Camerer and Fehr, 2006).

[45] TOA started in Berlin but has also organized conferences in i.e., Los Angeles and Tokyo.

The experiment was computerized using the experimental software z-Tree (Fischbacher, 2007) and run via a mobile laboratory, consisting of 20 laptops and sideboard blinders in order to increase the level of anonymity and privacy.[46]

The recruitment process for both conferences was identical: Subjects were recruited directly at the conference location. Upon approach, the opportunity to participate in a decision-making experiment in which they, based on their decisions, could earn money, was briefly explained. Potential subjects further received information about (a) the location of the room (which was also provided in the conferences' programs), (b) the approximate duration of the experiment and (c) the different time slots available for participation. Additionally, flyers containing this information were handed out.

We cannot, based on the experimental design, make any statements regarding the degree of acquaintance between subjects. However, throughout the recruitment process people were generally approached individually, or if in pairs, were asked to come to sessions at different time slots. Additionally, the minimum level of subjects per session was set to n=8, to further assure sufficient anonymity.

All eight sessions lasted between 45 and 60 minutes. When subjects arrived at the experimental lab, they were randomly allocated to one of the 20 laptops. This was done by blindly drawing a numbered ticket, linked to one of the laptops. Once all subjects were allocated to a laptop, the experimental instructions were read out aloud by the experimenter and at the same time visible on the computer screens. Subjects were instructed not to communicate with each other throughout the entire experiment. Also, they were ensured that all information provided by them would be treated confidentially and anonymously, and that none of the other participants would be able to trace their contribution decisions back to them. In the first part of the instructions, subjects received information about the general structure of the experiment and its incentive compatible mechanisms. Finally, subjects were informed that they would receive further, more detailed instructions once they would enter the different parts of the experiment (please

[46] In particular for the context of our experimental design, anonymity plays an important role in order to avoid, i.e., reputation concerns beyond those intended by the game (for the effects of anonymity/scrutiny see, e.g., Hoffmann et al., 1994; Eckel and Grossmann, 1996; List, 2007; Franzen and Pointer, 2012).

refer to Appendix 6.3. for the complete instructions). Subjects had the opportunity to raise their hand and quietly ask the experimenters questions throughout the entire experiment.

4.3.2. Business and economics students

In addition to the subject pool from the conferences, we ran experimental sessions with student subjects, conducted in the decision-making laboratory of Humboldt Universität zu Berlin, in Mai 2017. Thereby, students from the field of business and economics[47] were recruited via the recruitment system ORSEE (Greiner, 2015). In total *N*=62 subjects participated. The operational procedure in the laboratory was identical to the one outlined for the participants at the conferences. Sessions lasted again between 45 and 60 minutes.

4.4. Experimental Structure

The experiment itself consists of several different parts, which will be described next. The first four parts of the experiment represent the *incentive compatible* parts, followed by a questionnaire collecting control variables, which, based on past research, might be relevant for the study at hand (i.e., entrepreneurial intent and entrepreneurial self-efficacy, as suggested by Weitzel et al. (2010) and Urbig et al. (2012)).

4.4.1. Elicitation of risk attitudes - Holt and Laury lottery

In the first part of the experiment, subjects played a "Holt and Laury" lottery, whereby ten paired lottery choices (lottery "A" and lottery "B") were presented. Subjects have, for each of the 10 presented lottery pairs, to decide which lottery type (A or B) they would prefer to play. This method allows eliciting an individual's level of risk preference by observing at which lottery pair an individual makes the crossover from lottery "A" (the less risky lottery) to lottery "B" (Holt and Laury, 2002). Switching between lottery 4 and lottery 5 implies risk neutrality, switching to lottery B before the fourth lottery choice implies risk seeking, switching after the fifth lottery pair to lottery B implies risk aversion. Professional and student subjects could earn up to €15.40 / €3.85 Euros in this part, respectively. A participant consistent with standard expected utility theory (EUT),

[47] Note, that we limited the recruitment process to students only from this field of study, as these types of students are most frequently used as proxies for entrepreneurs.

based on the axiom of monotonicity, can only have one crossover point. Further, the crossover always goes from the safe option (A) to the risky option (B). Finally, sticking with option "A" for all 10 lotteries violates EUT's axiom of dominance. Some of our participants do violate the assumptions of rational behavior within this lottery game (i.e., depicting more than one crossover point) and hence exhibit inconsistent risk attitudes[48]. These individuals were eliminated from the analysis whenever risk attitudes were assessed. Higher values of this variable denote higher levels of risk aversion.

4.4.2. Dictator game 1

In the second part of the experiment, subjects played the first dictator game.[49] Thereby, subjects received the general instructions of the game, and were informed that the computer would randomly assign them to the role of *"participant 1"* (the dictator) or *"participant 2"* (the receiver). The game was worded in an unframed, neutral context, in which simply an "opportunity" was presented (please refer to Appendix 6.3. "Experimental Design", for the detailed wording of the instructions). Dictators from the student/professional sample received an endowment of €5/€20 respectively. All endowments were payoff relevant. Instructions further highlighted that the randomly matched counterparty would hold only for this part of the experiment and would be randomly matched anew for each of the following parts. This was deemed necessary in order to enforce the aspect of *unconditional* kindness described earlier (section 4.2.2.1.). Subjects were informed that no money, earned in any part of the games, could be transferred to other parts. Next, subjects had to answer comprehension questions to ensure their understanding of the payoff function[50]. Once completed, the computer randomly allocated the roles, and the dictator made his/her allocation choice. It was possible to split the endowment in cent amounts.[51] Notably, the receiver did not obtain any feedback

[48] The problem of multiple switching points is a known concern of this instrument (see e.g., Charness et al., 2013). While Holt and Laury (2002) only observe a share of about 9 percent of subjects with multiple switching points, Laury and Holt (2008) observe about 28 percent of their subjects switching more than once.

[49] Note, subjects were not informed of playing another dictator game later in the experiment. They were simply told there would be several different parts of pay-out relevant games.

[50] In order to avoid potential anchoring heuristics, we presented the comprehension questions with letters rather than monetary amounts.

[51] Hence, action space in this game was continuous, and not as usual quasi-continuous, as subjects could decide to give any amount, and were not limited to giving in integer dollars. This was also decided on the

regarding the dictator's choice until the very end of the experiment, as we wanted to avoid subjects being potentially influenced by such information in the following games. Since we are interested in eliciting subjects' intrinsic preference of altruism/fairness, we aimed to exclude any potential mixed motive, i.e., strategic considerations. Therefore, this game was played as a "one-shot", or static game.

4.4.3. Cooperation game

In the third part of the experiment, subjects played a standard linear public good game with 2 players (see also section 4.2.2.2.).[52] For this part of the experiment, subjects were randomly matched with a *new* counterparty. The following monetary payoff function (1) was carefully explained to the subjects, providing several in-depth calculation examples in the instructions.[53]

$$\pi_i(g_1, g_2) = endowment - g_i + \alpha\,(g_1 + g_2) \qquad (1)$$

The instructions described the public good neutrally as "the project". In the following, we also refer to this game as the "cooperation game". The total contribution to the project is given by the sum of contributions $g_1 + g_2$. In our design, the marginal payoff from individual *i*'s contribution to the project, $\frac{d\pi_i}{dg_i} = -1 + \alpha = -0{,}3$ is negative, but the social marginal benefits $\frac{d\sum \pi_i}{d\sum g_i} = -1 + 2\alpha = 0{,}4$ are positive. As was outlined in section 4.2.2.2., the payoff function is designed so that the Pareto optimum is defined by subjects contributing everything to the "project", while the dominant strategy for an individual subject is to contribute nothing. Endowments were the same as in the dictator game (€5 for the students, €20 for the professional sample).

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basis that an equal (50:50) split had to be made available to the subjects, which involved cent amounts in the 5 Euro endowment case. We deemed this crucial also for cross-sample comparison reasons.

[52] We decided on a two-player game, rather than a multi- player game as we wanted to minimize the coordination aspect and focus rather on the *strategic aspect of cooperation*, in line with our research question. In addition, while a public good game with two individuals is often argued to be like a classic prisoners' dilemma game, the games are not identical. The voluntary contribution mechanism in the public good game has a considerably larger strategy set than in the classic prisoners' dilemma game with only two choices, defect/cooperate (see also Isaac and Walker (1988) for a discussion on this).

[53] Thereby, the examples were constructed, ordered and written up in a way to minimize the possibility of subjects becoming anchored in their decision choice.

After reading the instructions, subjects had to answer six comprehension questions[54], ensuring that all subjects clearly understood the procedure and the financial consequences of their choices. Once all participants had correctly completed the comprehension questions, they received further, more detailed game-specific information, i.e., that several rounds of the game would be played and that their randomly assigned counterparty would remain the same for all rounds played. As we are interested in investigating inter-temporal, strategic choices, subjects played ten rounds of the public good game. After every round, subjects received feedback about (i) their counterparty's contribution, (ii) their own contribution and (iii) the consequently resulting (potential) profit from the respective round. Feedback information in the context of voluntary contribution games allows subjects to engage in social comparison, whereby the behavior of the counterparty serves as a reference point (Bazerman et al., 1992). This information is particularly important when individuals strongly care about how their contribution compares to the contribution behavior of the counterparty (Andreoni and Petrie, 2004). We decided not to explicitly inform subjects about the exact number of rounds to be played - instructions simply stated that they would play "several rounds of the game" – as we wanted to avoid behavior of strong iterated thinking. This arguably makes the situation more realistic (see Progrebna et al., 2011).[55] Finally, participants were informed that at the end of the experiment, one of the rounds played would randomly be drawn by the computer for compensation purposes. Again, none of the profits earned in current rounds could be accumulated or used in following rounds.[56]

[54] Again, the questions were constructed, ordered and written up in a way we believed would minimize the possibility of subjects becoming anchored in their decision choices.

[55] It could be argued that noise is generated within our data by not telling subjects about the exact number of rounds to be played, as subjects could potentially guess about the exact number of rounds to be played, creating *end-game* effects. However, as subjects were aware that there would be more parts in the experiment (of which they had no detailed information, i.e., regarding their required time frames) we believe it was hard and unlikely for them to make estimates in this regard.

[56] We further decided not to elicit subjects' beliefs regarding the actions of the counterparty, as beliefs do not allow us to distinguish between free-riders and distrustful conditional co-operators, i.e., those that contribute nothing *and* believe the other will not contribute anything either and people that contribute nothing *because* they believe others will contribute nothing (see Fischbacher and Gächter, 2010).

4.4.4. Dictator game 2

Once the public good game was completed, participants continued with part four of the experiment – which presented the last game. Here, subjects played another one-shot dictator game, this time taking the opposite role as in the first dictator game (i.e., if they were allocated the role of the receiver in the first dictator game, they were now allocated the dictator role and vice versa if they held the role of the dictator in the first game). The counterparty was randomly matched anew by the computer – this was stressed in the instructions. Endowments (levels identical as in the previous games) and allocation choices were pay-out relevant. Subjects received feedback regarding the dictator's allocation choice at the end of the experiment, once the questionnaire, described below (see section 4.7), was completed.

4.4.5. Stake size

We varied stake sizes for the incentive compatible part of the experiment (i.e., the Holt and Laury lottery, the dictator game, and the public good game) within the professional crowd[57] (entrepreneurs and other professionals working within the start-up industry), while all student subjects played for the same stakes. Thereby, the low-stake size in the sample of professionals was identical to the amounts applied in the student sample (i.e., a €5 endowment in the dictator and public good game), while the high-stake size was scaled by a factor of four (i.e., a €20 endowment in the dictator and public good game). Our reasoning for varying stake sizes was twofold:

(1) The first reason is the classic argument of *opportunity costs*: as entrepreneurs and professionals in relation to students face generally higher opportunity costs when participating in decision-making experiments, the pay-out structure of experiments has to account for these different cost structures, so as to maintain the criteria of *satiable rewards* (Vernon Smith, 1979). Hence, rewards in experiments are usually scaled up by a certain factor when dealing with professionals rather than student

[57] At the ECFI all sessions were conducted with high stakes. At TOA two sessions were conducted as low-stake treatment and two sessions as high-stake treatments. It was randomly decided at the beginning of the experimental session whether the session would be played as high or low-stake treatment. This was done by letting a randomly chosen subject pick from a choice of sealed envelopes and hand it to the experimenter (in which a piece of paper stated "high" or "low"). The subject did not know about the implications of her choice and did not see the envelope's content.

subjects. In line with other studies (i.e., Sandri et al., 2010), we scaled the pay-outs by a factor of four for our professional sample.

(2) We nonetheless decided to additionally run the experiment with low stakes in the professional sample. This was done on order to check whether results obtained across stake sizes are comparable – hence, whether stake size matters in these games, as the evidence in this regard is rather mixed.[58] Further, as the entrepreneurial crowd was already attending the conferences anyway, it is debatable whether the opportunity cost in such an instance is as high as otherwise. Maybe lower pay-outs in such a case can still produce reliable findings at lower experimental costs.

However, looking at the data of the professionals' sample, we obtained considerably diverging results in the case of low stakes, suggesting the data in this instance to be potentially unreliable. Table A X, Appendix 6.3. summarizes these results. The interpretation of these findings become in particular difficult, as we cannot strictly disentangle the potential effect of stake size to the potential effect of experimental design (for example, did a certain experience in the cooperation game (partially) affect these results, potentially even in interaction with stake size; or are the observed findings completely independent of game experience?). Based on this vagueness, as well as the aforementioned mixed evidence in the context of games and stake size, we decided to approach this conservatively. In order to create an incentivized preference revealing context, the assurance of *satiability of rewards* is paramount for us (reason 1 above). Consequently, we decided to exclude the low stake data of the professional subject pool. While resulting in a smaller sample size, the quality of the data is thereby ensured. In the

[58] There is mixed evidence regarding the strategic effect of different stake sizes on players. While most studies found no difference in this regard (Forsythe et al. (1994); List and Cherry (2008) in case of the dictator game; Hoffman et al. (1996) and Slonim and Roth (1998) using the ultimatum game; Carpenter et al. (2005), applying both dictator and ultimatum game; Fehr et al. (2002) for the gift-exchange game; Clark and Sefton (2001) for a sequential Prisoner's Dilemma game; Kocher et al. (2008) for a linear public good game). Others found a negative correlation between stake size and contribution behavior (Johannson-Stenman et al., 2005 in the trust game; Andersen et al. (2011) in the ultimatum game (however, it should be noted, that the stakes in this study were very high (some as high as an average annual income). In Engel's (2011) meta-study on the dictator game, the author finds a significant negative effect on dictators' allocation decisions for high stakes. Camerer et al. (1999) deal with the literature of stake size within bargaining games and conclude that stake size within this context does not affect subject's average level of self-interest, but that higher stakes potentially decrease the variance of subjects' behavior. Within this context, also risk aversion might play a significant role.

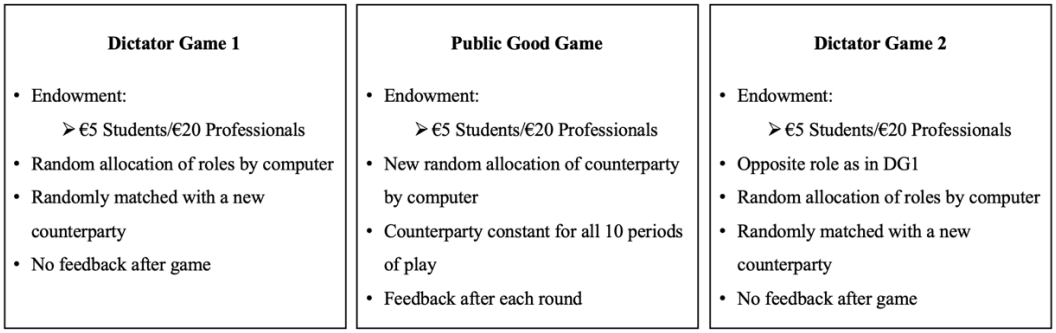
rest of the paper, we will consequently only deal with and analyze the data generated in the high-stake scenario.[59]

4.4.6. Pay-out structure

Subjects' total pay-outs were based on the previously described four parts and determined at the very end of the experiment. Thereby, for the first part (Holt and Laury lottery) the computer randomly chose one of the ten lottery pairs relevant for pay-out. For the dictator game, subjects were paid out the money they decided to keep for themselves (when allocated the role as dictator) and the money they (potentially) received (in the role of the receiver). Finally, as previously described, one of the ten rounds of the cooperation game were randomly selected for pay-out.

Figure 3 summarizes the structure and important details of the incentive compatible part of our experiment.

Figure 3: Summary of game structure for the elicitation of social preferences



4.4.7. Questionnaire

The experiment concluded with a questionnaire, collecting additional (control) variables. First, subjects had to answer some general demographic or business-related questions. There are slight variations in relation to these questions between the professional and student sample, based on the relevance (in Appendix 6.3. the questionnaires of the professionals and students are outlined separately). Entrepreneurs for example had to indicate how *social* they would consider their business. We collected the variable on a Likert-scale from 1 to 7: 1= operate a social business; 7= not at all social

[59] More information / data on this can be requested from the authors upon request.

business. A social business was thereby defined as follows: *"a social business intends to explore and exploit opportunities to create social value while also pursuing financial goals. This includes any kinds of activities that have particularly social, environmental, or community objectives."* This definition was inspired by the GEM report on social entrepreneurship (see also Bosma et al., 2016).

Students next had to answer questions regarding their *entrepreneurial intentions* (EI). Following the approach by Urbig et al. (2012), we measured this construct using a 5-item measure developed by Chen et al. (1998). Example items include *"How interested are you in setting up your business"* and *"How likely is it that you will set up your own business in the near future."* Responses to items were averaged to form an overall measure of entrepreneurial intention. Higher scores thereby represent greater levels of entrepreneurial intentions.[60] Next, we measured trust, using the traditional questions from the German socioeconomic panel (SOEP). Then, participants answered questions eliciting personal values based on Schwartz's value theory (Schwartz, 1992).[61] The data in regards to trust and values will not be analyzed for the purpose of this paper.

As Weitzel et al. (2010) find individuals to differ significantly in their allocation choices towards others, based on their scores in relation to entrepreneurial self-efficacy (in particular in relation to their scores on business vs. creative talent), we control for these aspects in our experimental design. For measuring entrepreneurial self-efficacy, we collect the same items as done in their research paper (based on Wilson et al., 2007; Zhao et al. 2005; Monsen[62]). In total 12 items are collected (please refer to Appendix 6.3. for the listing and exact wording of the items). On a 7-point Likert-scale, subjects had to rate their confidence regarding their ability to perform creative or business tasks (i.e., ability to be creative; ability to manage money) relative to their peers. These two factors will

[60] Students were additionally asked questions about their personality (see paper 4 for details) and unproductive and productive entrepreneurial motives (Hmieleski and Lerner, 2016). This data will be evaluated in detail in the fourth paper of this dissertation.

[61] Using the World Values Survey (WVS) - this instrument measures the ten basic, motivationally different values proposed by Schwartz's value theory (Schwartz, 1992, 1994; Spini, 2003): Power, achievement, hedonism, stimulations, self-direction, universalism, benevolence, tradition, conformity, and security.

[62] The items by Monsen were suggested verbally during the study (see Weitzel et al, 2010 for details).

later be employed for testing their impact on contribution behavior for the student and professionals subject pool.

This concludes the description of the experimental design and procedure. We next present the data and its analysis.

4.5. Data and Results

4.5.1. Demographics: Entrepreneurs and professionals

Across the two conferences a total of *N*=82 subjects participated. In the following, we also refer to these subjects as *entrepreneurial crowd*: *n*=46 stem thereby from the ECFI in Hamburg and *n*=36 from the TOA in Berlin. The sample's average age is *M*=32 years (*S.D.*=7.39) and consists to 80.5 percent (*S.D.*=0.398) of males.

As we are particularly interested in the behavior and decision-making of entrepreneurs, we split the entrepreneurial crowd sample at times into the sub-samples of *entrepreneurs*[63] (E) (*n*=55) and *start-up employees, collaborators and investors* (ECI) (*n*=27).[64] The gender ratio amounts to 90.9 percent (*S.D.*=0.2901) male subjects in the sub-sample of entrepreneurs and 59.3 percent (*S.D.*=0.5007) in the sub-sample of start-up employees, collaborators and investors (ECI). While this ratio appears unbalanced, in particular in case of the entrepreneurs, it is unfortunately reflective of the current gender ratio in the start-up industry. According to the German start-up monitor (2016), the ratio of female founders within the German start-up industry amounts to 13.9 percent. Correspondingly, the Diana Project[65] (2014), investigating the gender gap within the venture capital industry, finds that out of all US companies receiving venture capital, only 15 percent to have at least one woman on the executive team.

Most subjects in our professional sample grew up in Europe (84.2 percent) and/or live there now (92.5 percent).[66] The average working experience amounts to *M*=4.73 years (*S.D.*=5.29) for the entrepreneurs and *M*=4.26 years (*S.D.*=4.184) for the start-up ECIs. The average pay-out for this sample group was 52.15 Euros.

[63] Individuals who founded a venture either by themselves or as part of a founding team.

[64] This sample consists of professionals with different background: e.g., employees of the start-up and technology industry (16 percent), consultants (14 percent), engineers/developers (12 percent), product managers (14 percent), creative artists (12 percent), and others (12 percent), such as business angels.

[65] This project was funded by the Kauffman Foundation, the U.S. Small Business Administration, the National Women's Business Council, and the Swedish Institute for Small Business Research.

[66] We control for culture as it has been shown to be a potential influencer in these types of decision settings (i.e., Henrich, 2000).

4.5.2. Demographics: Student subjects

We collected data on *N*=62 student subjects. The average age of this sample is *M*= 23 years (*S.D.*=2.59). Thereby, females constitute 53.2 percent. We recruited students via ORSEE (Greiner, 2015) and exclusively from the faculty of economics and business.[67] Again, most subjects (93.5 percent) grew up in Europe. Average pay-outs were 13.47 Euros.

4.5.3. Comparison of conferences

Before analyzing the games section of our experiment, we controlled if the data of the two conferences could be merged or whether results across conferences differed significantly. We did this by comparing the behavior of both dictator games, as well as the first round of the public good game. The first round of the public good game is analyzed separately from the other rounds of the game, as it constitutes an initial condition to cooperation (also termed *first-period play*) and is consequently unrelated to any learning. Results of all games show, using Wilcoxon rank sum tests, no significant differences for the contribution behavior of the ECFI and the TOA.[68] We consequently merge the data of the conferences and proceed with the analysis.

4.5.4. Analysis: Dictator game

We start our analysis by looking at the behavior in the dictator game(s). Recall that each individual played the dictator game twice, but was only *once* in the role of the dictator (and once in the role of the receiver). Table 18 below demonstrates that our entrepreneurial crowd sample (separated by entrepreneurs and start-up ECIs) exhibits very similar allocation choices in both dictator games. Fairness considerations within the *entrepreneurial crowd* sample appear to be consistent, independent of whether you

[67] Thereby, 50 percent studied economics, 35 percent studied business, 10 percent studied a combination of economics and business, and about 5 percent majored in statistical methods.

[68]Results for DG1: *M*=6.89, *S.D.*=3.34 and *M*=6.8, *S.D.*=3.95 respectively; *z*= 0.13, *p*=0.89. Results for public good game: *M*=14.39, *S.D.* =5.83 and *M*=12.21, *S.D.*=6.55 respectively; *p*=0.13. Results for DG 2: *M*=8.01, *S.D.*=6.41 and *M*=7.22, *S.D.*=3.81 respectively; *z*=0.367; *p*=0.71. Using simple regression analysis, with contributions (% of endowment) made to the receiver/to the public good as the dependent variable, and controlling in addition to conference type also for group type (dummy variable termed entrepreneur) and gender, we find no significant relationship between the contribution behavior and conference type for both dictator games and the contribution behavior in the public good game.

actually own and operate a business – or 'simply' work within or closely associated to the start–up industry.

Table 18: Summary statistics DG1 and DG 2: Entrepreneurs and Start-up ECIs

Allocation (in % of endowment) of dictator to receiver: Dictator Game 1					
	Obs	Mean	Std. Dev.	Min	Max
Entrepreneurs	23	34.65%	0.1795	0	0.5
Start-up ECI	18	33.89%	0.1828	0	0.75
Wilcoxon Rank Sum test: E vs. ECI: z=0.6; p=0.54					
Allocation (in % of endowment) of dictator to receiver: Dictator Game 2					
	Obs	Mean	Std. Dev.	Min	Max
Entrepreneurs	32	38.03%	0.2551	0	1
Start-up ECI	9	39.44%	0.3311	0	1
Wilcoxon Rank Sum test: E vs. ECI: z=0.148; p=0.88					

Due to the very similar behavior in this group and in order to increase statistical power, we join the data of the entrepreneurial crowd and compare their behavior to that of our student subjects in the dictator game.

Comparing the professionals' average donations to those of the student sample (see Table 19), we observe the entrepreneurial crowd to allocate on average M=34.3 percent ($S.D.$=0.1787) of their endowment to the receiver in DG1, while students allocate M=26.38 percent ($S.D.$=0.2472). The entrepreneurial crowd allocates hence, relative to the student sample, 30 percent more of their endowment to the receiver. The result is marginally significant using a Wilcoxon Rank Sum Test (z=-1.650; p=0.09). The difference between the two groups is even more pronounced in the dictator game played *after* the cooperation game (DG2), and highly significant (z=3.805; p=0.000). We observe in DG2 relative to DG1, the entrepreneurial crowd subjects on average to slightly increase their allocations to the receiver (from M_{DG1}=34.31 percent to M_{DG2}=38.34

percent), while student subjects demonstrate a pronounced decrease in their allocation levels (from M_{DG1}=26.38 percent to M_{DG2}=14.92 percent).

Table 19: Summary statistics DG1 and DG 2: Entrepreneurial crowd and students

Allocation (as % of endowment) of dictator to receiver: Dictator Game 1					
	Obs	Mean	Std. Dev.	Min	Max
Entrepreneurial crowd	41	34.31%	0.1787	0	0.75
Students	31	26.38%	0.2472	0	0.98
Wilcoxon Rank Sum test: z=-1.650; p=0.09					
Allocation (as % of endowment) of dictator to receiver: Dictator Game 2					
	Obs	Mean	Std. Dev.	Min	Max
Entrepreneurial crowd	41	38.34%	0.2691	0	1
Students	31	14.92%	0.1910	0	0.5
Wilcoxon Rank Sum test: z=-3.805; p=0.000					

The data hence suggests that subjects who made their allocation choice in the role of the dictator *after* playing the cooperation game might have been influenced by the ordering of the games, and that this is not linear across the groups of students and professionals, but that students are more strongly affected by this *ordering effect.* Consequently, when joining the data of the dictator games in the following regression analyses, we control for the ordering of the games, as well as interaction effects in relation to group type (student vs. entrepreneurial crowd). The dummy variable in this case is termed *game experience* and equal to one, if the subject is allocated the role of the dictator *after* having played the cooperation game and zero otherwise.

Table 20 summarizes the hierarchical regressions analyses. The results of the Tobit regressions show that in comparison to the student sample, the entrepreneurial crowd to allocate significantly more funds to the receiver (β=0.265; p=0.000), demonstrating higher levels of altruism or fairness considerations. The finding remains highly significant when controlling for game order (2) (β=0.264; p=0.000), as well as for an interaction effect between the group and game order variables (3) (β=0.167; p=0.025).[69] As risk

[69] Note, also when running the regression separately for DG1 and DG2, the entrepreneurial crowd still allocates significantly more to the receiver (in DG1: β=0.151; p=0.024, in DG2: β=0.401; p=0.000). Regression results are provided in Appendix 6.3., Table A XII.

preferences did not enter any of the regression analyses significantly (or change the regressions' output in any way), we dropped risk from the further analysis in order to be able to increase our sample size (as this allowed us to include those subjects violating the EUT assumptions in the Holt and Laury lottery), see Table A XI, Appendix 6.3. for output regressions with risk.

Table 20: Tobit regressions - Dictator game

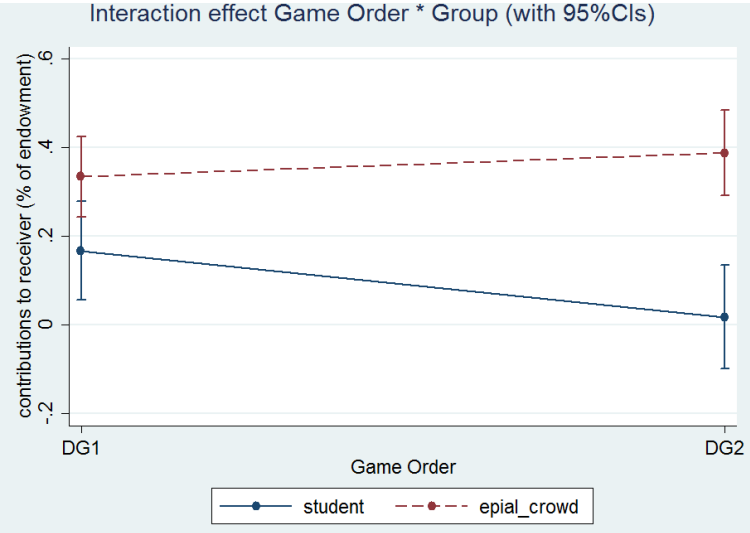
Dependent variable: Individual contributions (as % of endowment)			
	(1)	(2)	(3)
Entrepreneurial crowd	0.265***	0.264***	0.167**
	(0.0573)	(0.0573)	(0.0737)
Male	-0.124**	-0.118**	-0.127**
	(0.0585)	(0.0591)	(0.0583)
Game Experience	-	-0.0309	-0.149*
		(0.0521)	(0.0794)
Entrepreneurial crowd*Game experience		-	0.203*
			(0.103)
Constant	0.176***	0.188***	0.250***
	(0.0478)	(0.0522)	(0.0596)
Sigma	0.298	0.298	0.293
	(0.0225)	(0.0224)	(0.0220)
Number of individuals	144	144	144
Log Likelihood	-61.07	-60.894	-58.99
LR $\chi 2$	21.41	21.77	25.560
(Prob.>$\chi 2$)	0.000	0.000	0.000
Obs. censored at zero	40	40	40
Obs. censored at one	2	2	2

Standard errors in parentheses

*p<.1, ** p<.05, *** p<.01

In line with past findings (i.e., Eckel and Grossman, 1998), we find males to allocate significantly less money to their counterparty. In the third regression (3), we see the interaction effect (p=0.052), depicted also in Graph 3 below, as well as the dummy of game order (p=0.062) to be marginally significant.

Graph 3: Interaction effect: game order*subject type



Next, we investigate the relationship of entrepreneurial self-efficacy, split into creative (CT) and business talent (BT)[70], and in case of the student sample also the impact of entrepreneurial intent, onto the behavior in the dictator game.

Entrepreneurial self-efficacy and entrepreneurial intentions in the dictator game

We start by comparing behavior of students scoring high on the scale of entrepreneurial intent, to the behavior of the entrepreneurs in our sample. Therefore, we run a median-split procedure, separating student subjects[71] into those with high entrepreneurial intentions (scoring above median), who in research studies would represent the "entrepreneurs" and those scoring below the median values (the "non-entrepreneurs"). Comparing their average contributions, via a simple t-test, we find no significant differences (t=-0.6404; p=0.2622) between the allocation choices of "student entrepreneurs" (M=22.66 percent, $S.D.$=0.2033) and those scoring low on entrepreneurial intent (M=18.98 percent, $S.D.$=0.2485). Looking at the regression output for the student sample in Table 21, these findings are supported. The variable of entrepreneurial intent is insignificant for predicting (higher) contributions to the receiver in the dictator game.[72] Further, we find in our student sample no significant association between entrepreneurial

[70] In line with Weitzel et al. (2010), we ran a principal factor analysis (promax rotation) to confirm that we could separate BT and CT in the same manner.

[71] This variable was, for somewhat obvious reasons, collected exclusively for the student sample.

[72] We also ran tests of correlation (both Spearman and Kendall) confirming the results of the regression.

self-efficacy (both business and creative talent) and the dictator's allocation choices. The coefficient of gender is significant (β=-2.05; p=0.03). Males allocate less to the receiver, as was observed in the earlier regressions and in line with past findings (e.g., Eckel and Grossman, 1998).

Table 21: Psychometric variables in the dictator game: Tobit regressions

Dependent variable: Individual contributions (as % of endowment)			
Variable	Entrepreneurs	ECI	Students
Male	-0.116	0.050	-0.205**
	(0.117)	(0.116)	(0.0923)
Entrepreneurial Intent	-	-	0.0293
			(0.0469)
Creative Skills	0.077*	-0.0104	0.070
	(0.0413)	(0.0839)	(0.0606)
Business Skills	-0.224***	-0.0641	-0.0995
	(0.0674)	(0.111)	(0.0864)
Game Experience	0.0887	0.0482	-0.0934
	(0.0704)	(0.116)	(0.0938)
constant	0.917***	0.555	0.274
	(0.255)	(0.397)	(0.267)
Sigma	0.239	0.275	0.317
	(0.0267)	(0.0441)	(0.0415)
Number of individuals	55	27	63
Log Likelihood	-11.00	-8.99	-29.79
LR χ2	0.0235	0.71	11.95
(Prob.>χ2)		0.9503	0.035
Obs. censored at zero	9	4	27
Obs. censored at one	1	0	0

Standard errors in parentheses

*p<.1, ** p<.05, *** p<.01

Turning to the findings for the entrepreneurs (column 1), we find a highly significant negative influence of business skills (β=-0.224; p<0.01) onto dictators' allocation choices. Creative talent affects entrepreneurs' donations to the receiver positively, the finding is marginally significant (β=0.077; p=0.068). The signs of both coefficients are in line with the findings by Weitzel et al. (2010) and Urbig et al. (2012).

In the sample of ECI, both business and creative talent are insignificant for predicting donation levels. We find creative talent to be irrelevant for start-up ECIs (β=-0.010, p=0.903). The gender variable in both groups (entrepreneurs and ECI) is insignificant, likely due to the imbalanced gender proportion in this sample (see section 4.5.1.). An alternative explanation for this finding could be that past research has shown that females, self-selecting themselves into business contexts such as the vocation of entrepreneurship, to be frequently systematically different in their behavior in comparison to other females (Artinger and Schade, 2013).

We also investigated whether entrepreneurs in our sample are influenced in their allocation choice by the way they operate their business, in a *social* sense (see section 4.2.2.1.). We expected entrepreneurs, who run a (self-reported) social business to be more likely to make higher allocation choices in the dictator game. However, interestingly no significant relationship was found in this matter (β=-0.011; p=0.576).[73]

This completes our analysis of the dictator game. Next, we analyze the data of the *2-player public good game*, measuring cooperative tendencies.

[73] The detailed statistical results in this regard are provided in Appendix 6.3., Table A XIII.

4.5.5. Analysis: Cooperation game

Analyzing the data of the cooperation game, we observe – contrary to the findings of the dictator game data - significant differences concerning the contribution choices of entrepreneurs and start-up ECIs (see Table 22). We consequently refrain from joining the data, as was done for the analysis of the dictator game, but look at the results of these two groups separately.

Initial levels of cooperation

We start by evaluating the allocation choices in the *first round* of the game. Thus, analyzing the *initial willingness* to cooperate, before any learning regarding the counterparty's behavior was possible.

Table 22 summarizes the average allocation levels[74] for the groups of entrepreneurs (E), start-up employees, collaborators and investors (ECI), and students respectively. We observe entrepreneurs, in relation to the other groups, to allocate significantly more funds to the project (M=73 percent), while the allocation choices of students and start-up ECIs are similar (M=55.33 percent and M=54.23 percent respectively) and in line with contribution levels observed in past research, which frequently amounts to approximately 50% of the endowment (see i.e., Cookson, 2000; Croson, 1996; Andreoni, 1988).

[74] As was done in the dictator game, average allocation levels are measured as a percentage of the endowment, in order to be able to compare behavior across the different levels of endowment between students and entrepreneurs.

Table 22: Average allocations for the initial willingness to cooperate by groups

Average allocation (in % of endowment) to the project in the first round of the game					
	Obs	Mean	S.D.	Min	Max
Entrepreneur (E)	55	73.00%	0.2948	0	1
Start-up ECI	27	55.33%	0.3147	0	1
Student	62	54.23%	0.3678	0	1

Wilcoxon Rank Sum test: Cooperation game		
E vs. ECI	E vs. Students	ECI vs. Students
z=-2.463; p=0.013	z=-2.796; p=0.005	z=-0.027; p=0.978

The results of the Wilcoxon Rank Sum tests confirm entrepreneurs' allocation choices in the first round to be significantly different to those of start-up ECIs (z=-2.463; p=0.013) and students (z=-2.796; p=0.005).[75]

The Tobit regression for initial individual average cooperation levels is depicted in Table 23 below. The results confirm entrepreneurs to allocate significantly more funds to the project than ECIs (β=-0.268, p=0.048) and students (β=-0.268, p=0.021). The effect size is identical for students and non-entrepreneurs. Gender plays no influence in the context of the cooperation game.

[75] To get a better understanding of our sample and their respective cooperative behavior, we also classified subjects' behavior based on their contribution choice in the first round of the public good game. Classification regarding cooperative dispositions has been suggested as useful. Andreoni (1995) for example argues that the regularly observed decline of contributions over multiple rounds in the public good game is due to co-operators becoming discouraged by their free-riding counterparties. Kurzban and Houser (2005) divide their subjects into co-operators, free-riders and reciprocators, based on their endowment proportion contributed to the pool, and their reaction to their co-player's contributions. Their findings suggest stable individual differences in cooperative dispositions. Thereby, it should be noted that the literature does not provide a clearly defined theoretical cut-off point which determines whether an individual classifies as free rider or co-operator. Hence, splitting our sample into such types of group classifications involves some degree of arbitrariness. We follow the approach of Isaac and Walker (1988) and classify someone as a *"co-operator",* if the contribution in the first round of the cooperation game exceeds 33 percent of the endowment; otherwise, (contributing 33 percent or less) subjects are classified as *"free- rider"*. A similar approach has been used by Gunnthorsdottir et al. (2007) – where the cut-off value was set at 30 percent. The details of the *chi-squared test* for differences in distributions are provided in the Appendix, section 6.3., Table A XVII. Findings show that we have significantly (p<0.05) more free riders in the sub-groups of start-up professionals and students, while there are more entrepreneurs in the *"co-operator"* classification. Again, this confirms the finding of our previous analysis identifying the group of entrepreneurs as more cooperative.

Table 23: Initial cooperation levels - Tobit regression

Individual contributions (as % of endowment) in t=1	
Start-up ECI	-0.268**
	(0.135)
Student	-0.268**
	(0.115)
Male	0.0970
	(0.107)
Constant	0.802***
	(0.124)
Sigma	0.527
	(0.0463)
Number of individuals	144
Log Likelihood	-122.306
LR $\chi 2$	10.85
(Prob.>$\chi 2$)	0.0126
Obs. censored at zero	15
Obs. censored at one	46

Standard errors in parentheses
*p<.1, ** p<.05, *** p<.01

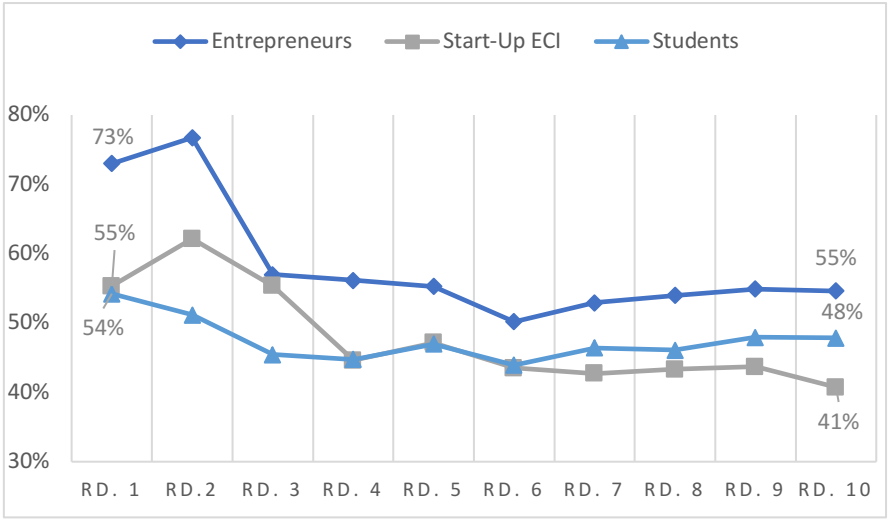
We next investigate how individuals change their allocation choices over time in the game (across the ten rounds played). This provides us with insights regarding the strategic or reciprocal nature of their cooperation, i.e., how (un)conditional their cooperation is upon the cooperation of the counterparty.

Average levels of cooperation

Graph 4 below depicts the average contribution behavior per round for the three groups respectively. In relation to past public good game research (e.g., Isaac and Walker, 1988; Ledyard, 1995; Andreoni, 1988; Fehr and Gächter, 2000), we observe generally similar contribution trends over time, although there are some large variations within our sample. Contributions decline from the first to the last round by 33.65 percent for entrepreneurs, by 26.37 percent for start-up ECIs, and by only 11.76 percent for students. However, due to the high initial levels of cooperation, in particular in case of the entrepreneurs, we also end up with high average contributions in the last round:

$M_{entrepreneurs(Rd.10)}$=54.62 percent; $M_{students(Rd.10)}$=47.85 percent and $M_{start-up\ ECI\ (Rd.10)}$ =40.74 percent – this is in comparison to i.e., 18.1 percent in Andreoni and Petrie (2004) and 10.6 percent in Croson (1996).

Graph 4: Average individual contributions over time by group.



In none of our groups do we observe declines even close to complete free riding. Despite displaying the strongest allocation decline across the game, we still observe entrepreneurs to make consistently higher allocation choices in comparison to the other two groups. Table 24 summarizes the average contribution levels across all ten rounds and the respective Wilcoxon Rank Sum tests.

Table 24: Average allocation levels to the project (all 10 rounds) by group

Average allocation (in % of endowment) to the project across all 10 rounds					
	Obs	Mean	S. D.	Min	Max
Entrepreneur	55	58.48%	0.2615	0.148	1
Start-up ECI	27	47.86%	0.2530	0	1
Students	62	47.48%	0.3771	0	1

Wilcoxon Rank Sum test: Cooperation game

E vs. ECI	E vs. Students	ECI vs. Students
z=1.708; *p*=0.088	1.824; p=0.068	z=0.201; p=0.841

While we see a marginally significant effect for the comparison of entrepreneurs in relation to the other two groups (see Table 24), we lose valuable information, particularly in relation to strategic concerns, by considering only average allocations over time.

As a consequence, in the following we run *random effects Tobit regressions*, using all ten rounds of play. The panel data analysis takes into account all ten choices made per subject, and further controls for right and left censoring (i.e., making zero contribution to the project or contributing the entire endowment to the project). Thereby, the dependent variable presents the subject's contribution to the "project". Exogenous variables include the group variable (entrepreneurs being the omitted category), gender, and a variable controlling for *conditional cooperation.* Thereby, we follow the approach by Croson et al. (2005). The variable takes into account the amount the subject's counterparty contributed to the project in t-1.[76] As the aim of this research is to detect potential differences in ORP for these groups, we also include an interaction term between the group variable and conditional cooperation (reflecting reciprocal tendencies, since what you give in the current period t is dependent on what you received from your counterparty in the previous period, (t-1)). The results are outlined in Table 25 below[77].

[76] We also controlled whether it made a difference if you were allocated the role of the dictator in DG1, or not (similar to the variable game order). No influence of game order was found, and the rest of the results stayed quantitatively the same.

[77] We assume uncorrelated standard errors over the repeated responses at the pairs level. We additionally performed a robustness check with standard clustered errors using Tobit regressions. Results remain robust.

Table 25: Cooperation game - Random effects Tobit regression

Individual contributions (as % of endowment)	
Conditional Cooperation	0.361***
	(0.0745)
Start-up ECI	-0.321*
	(0.164)
Student	-0.502***
	(0.145)
Male	-0.056
	(0.123)
Conditional cooperation*ECI	0.202
	(0.129)
Conditional cooperation*student	0.616***
	(0.128)
Constant	0.540***
	(0.146)
Number of individuals	144
Number of observations	1368
Obs. censored at zero	361
Obs. censored at one	410
Log Likelihood	-925.266
Wald $\chi 2$	133.390
(Prob.>$\chi 2$)	0.000
Error Components:	
σ_u	0.587
σ_e	0.443
ρ	0.6374

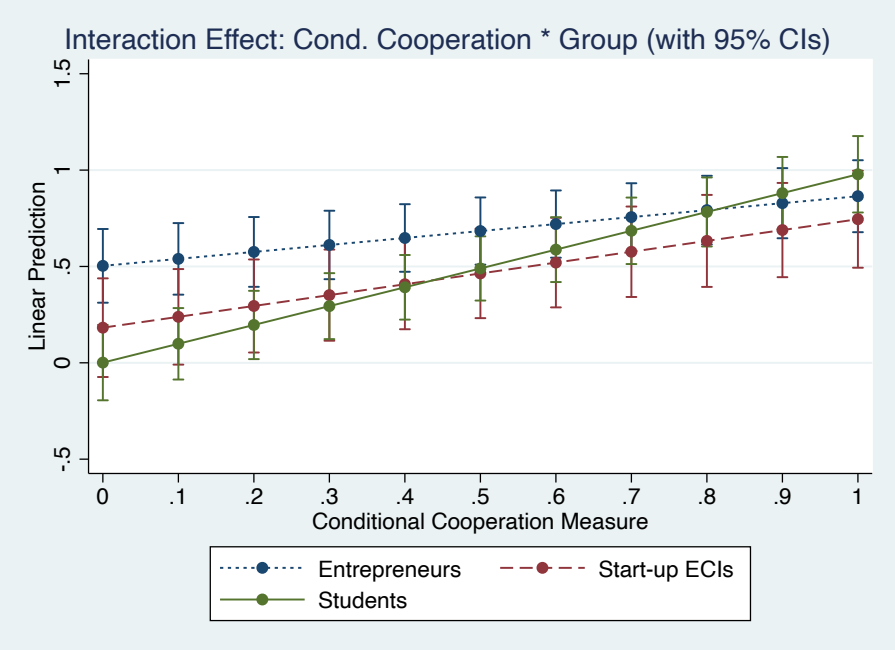
Standard errors in parentheses; *p<.1, ** p<.05, *** p<.01

We find subjects to condition their behavior on the allocation choices of their counterparty in the previous period (β=0.361; p=0.000). More interestingly, start-up ECIs allocate less funds to the project than entrepreneurs (β=-0.321, p=0.051); this effect is even more pronounced for the students and highly significant (β=-0.502, p=0.001). The variable of gender is insignificant (as was the case for the analysis of initial cooperation).

This is in line with other past research, reporting no systematic differences between male and female contribution behavior in public good experiments (see Ledyard, 1995; Eckel and Grossman, 2008).

We see both students and start-up ECIs to be more conditionally cooperative than entrepreneurs (as both coefficients of the interaction terms are positive). This holds in particular for the students. Their cooperation is significantly more conditional than the entrepreneurs' (p<0.01). Hence, students are systematically more influenced by reciprocal considerations in the given decision-making context. This is also observable from the slopes depicted in Graph 5 below.

Graph 5: Interaction effect - group*conditional cooperation



Entrepreneurial self-efficacy and entrepreneurial intent in the cooperation game

We finally investigate the impact of the psychometric variables, namely entrepreneurial self-efficacy and entrepreneurial intent, onto the behavior in the cooperation game. Thereby, we distinguish the connection in regards to initial cooperation and cooperation throughout the game (see Table 26 below). Further, results are reported for the entrepreneurial crowd, as well as for its individual sub-samples, namely entrepreneurs and start-up ECIs.

Starting with initial cooperation, none of the psychometric variables (neither entrepreneurial intent nor entrepreneurial self-efficacy) significantly impact allocation choices to the project (regression results are presented in Appendix 6.3., Table A XIX). This holds for the student as well as for the entrepreneurial crowd sample.[78] Analyzing the impact of business and creative talent on allocation choices of entrepreneurs and ECIs separately, we find none of the psychometric variables to significantly influence entrepreneur's initial cooperation levels. For the sample of start-up employees, collaborators, and investors (ECI), we do find a marginally significant negative influence of business talent onto allocation levels in the first round of the game (β=-0.277, p=0.064). Creative talent (β=0.024, p=0.826) is not significant in this context.

Looking at cooperative choices throughout the game (running a Tobit random-effects regression, see Table 26) the findings are similar to the initial cooperation results. We find none of the self-efficacy variables to significantly influence entrepreneurs' and students' allocation choices. For the subsamples of start-up employees, collaborators and investors (ECI), we do find a highly significant negative relationship between business talent and allocations (β=-0.433, p<0.01), creative talent is insignificant (Table 26), middle column).

[78] We do however find the variable of gender to be highly significant and positive (β=0.399, p=0.003), a result we view with some caution, given the specificity of the sample constellation, and past research in this field (i.e., Ledyard, 1995; Eckel and Grossman, 2008).

Table 26: Psychometric variables in the cooperation game. Tobit random-effects regression

Dependent variable: Individual contributions (as % of endowment)			
Variable	Entrepreneurs	ECI	Students
Male	-0.0547	0.0516	0.211
	(0.281)	(0.168)	(0.275)
Entrepreneurial Intent	-	-	-0.0706
			(0.140)
Creative Skills	-0.0181	0.108	0.228
	(0.0972)	(0.119)	(0.176)
Business Skills	-0.222	-0.433***	-0.0703
	(0.155)	(0.165)	(0.255)
constant	1.665***	1.554***	0.107
	(0.614)	(0.588)	(0.797)
Number of individuals	55	27	62
Number of obs.	550	270	620
Obs. censored at zero	102	56	212
Obs. censored at one	190	160	189
Log Likelihood	-476.25	-201.83	-365.38
Wald $\chi 2$	2.67	7.21	2.09
(Prob.>$\chi 2$)	0.445	0.065	0.719
Error Components:			
σ_u	0.543	0.379	0.951
σ_e	0.557	0.421	0.413
ρ	0.487	0.449	0.841

Standard errors in parentheses

*p<.1, ** p<.05, *** p<.01

Next, we summarize and discuss our findings, consider the potential limitations of our study and offer ideas for future research avenues.

4.6. Discussion

4.6.1. Findings for the dictator game

Summarizing the findings in relation to the preference of altruism or fairness considerations, we find entrepreneurs as well as start-up employees, collaborators, and investors to make systematically higher allocation choices to the receiver in the dictator game than student subjects. This finding hence only partially supports our first hypotheses, namely that *entrepreneurs allocate more funds to the recipient than both of the other natural groups in our sample (students and start-up ECIs).* While this finding is noteworthy, the interpretation is not an easy one. We know from past studies (List, 2004; Carpenter et al., 2008; Burks et al. 2009; Falk et al., 2013) that "[…] students in the laboratory tend to produce the lower bound of social preference measures." (Burks et al., 2009, p. 459). This also holds for our findings. However, given that a large share of entrepreneurs (as well as ECIs) are likely to have studied business and economics before embarking onto their vocation as entrepreneurs, our findings do indicate that social preferences might either not be as stable as suggested (i.e., De Oliverira et al., 2012), or that the context of workplace indeed plays a considerable role, or both.

Comparing our results to those of Engel's (2010) meta-study of dictator games (Engel reports a range between about 27 percent and 38 percent of endowment), we find the allocation levels of the entrepreneurial crowd (M=36.33 percent) to be at the "upper-end" range, while our student subjects (M=20.74 percent) are playing even "tougher" than the results provided by Engel (2010). Based on these numbers, we may conclude that there appear to be considerable concerns of altruism/fairness within the start-up industry. It would be interesting to observe in future studies how these findings compare to other professions (i.e., from the financial and/or medical sector).

Somewhat surprisingly, but in line with the findings by Jänicke and Lauritzen (2019), we do not find a relationship between the behavior in the dictator game and the (self-reported) measure of a social business. Hence, our findings do not support our second hypothesis. This clearly raises the question as to how the shaping of social preferences exactly manifests into the daily as well as long-term decision-making of entrepreneurs, something we did (apart from the social business variable) not control for

in our experimental design. As this information would also provide insights regarding the external validity of our findings, we invite future research to further investigate this aspect.

Another interesting finding, less connected to entrepreneurship research but valuable for experimental research, presents the observation that students appear to be more influenced by the *ordering* of the games. While students strongly decreased their allocations in DG2, relative to DG1, entrepreneurial subjects slightly increased their donations in DG2. We invite future research to further investigate this aspect, as this might be in particular relevant for studies investigating a range of economic games as a within-subject design.

4.6.2. Findings for the cooperation game

We observe entrepreneurs, in comparison to both students as well as start-up employees, collaborators, and investors (ECIs) to exhibit a significantly higher initial willingness to cooperate in the public good game. While entrepreneurs allocate on average M=73 percent of their endowment to the public good in the first round of play, students and ECIs both allocate on average about M=55 percent.

Considering all periods of play, we again observe entrepreneurs to allocate consistently (in all rounds) more funds to the 'project' than both students and ECIs. Our findings hence indicate entrepreneurs, in line with our third hypothesis, to hold stronger concerns for pro-social behavior when it comes to the context of cooperation. As argued in section 4.2.2., this finding is most likely driven by the unique conditions of the entrepreneurial environment, facilitating or shaping social norms conducive for cooperation. Entrepreneurs appear to have (developed over time?) a better understanding of the mutual benefits from cooperation in a social dilemma game - which in many ways reflect the payoff structures they face in their business operations (i.e., when dealing with investors, suppliers and similar, see Cable and Shane (1997) for a nice theoretical discussion on this). Hence, the willingness to cooperate might offer a very relevant comparative advantage in this context.

As was the case for the preference of altruism, we do not find a significant link between cooperative preferences and (self-reported) social venturing. While arguably somewhat less surprising in this context, it would have still been valuable to get an indication as to how social preferences, elicited via laboratory experiments, manifest in, i.e., operational or strategic decision-making of entrepreneurs.

The last two points discussed, both relate to the generalizability of our findings and its implications. There is an ongoing debate in the academic literature regarding the external validity of social preferences in the field. How do social preferences elicited in laboratory settings actually play out in the "real world"? Can we systematically link behavior observed in the field to behavior elicited in the laboratory when it comes to social preferences? While a sound experimental design is crucial in this context (see Levitt and List, 2007; Schade, 2005), the empirical evidence in this matter is still rather mixed: Some studies report a significant link between laboratory and field behavior for social preferences (Barr and Serneels, 2009; Franzen and Pointer, 2013; Kolstad and Lindkvist, 2012; Fehr and Leibbrandt, 2011), other studies find no association (Goeschl et al., 2015; Torres-Guevara and Schlüter, 2016). Fehr and Leibbrandt (2011) for example report a significant link between behavior in economic games measuring cooperation and actual cooperative behavior in the workplace. As we did not control for operational or strategic decisions of entrepreneurs in our experimental design (apart from the social venturing aspect), we cannot make claims regarding their potential link to social preferences. We invite future research to observe how and to what extent these stronger cooperative tendencies influence entrepreneurs' decisions as well as certain venture performance measures, e.g., earnings and productivity. For future studies it would be interesting to observe to what extent our finding in the public good game is driven by *efficiency* concerns.

Our findings show students to be significantly more influenced by the factor of *conditional cooperation* considerations than entrepreneurs. Hence, while entrepreneurs act rather independently of their counterparty's choice to cooperate in the previous period, students (but also ECIs) are highly influenced by this. While the implications of this could be diverse in an operational context, the finding suggests entrepreneurs to be more autonomous in their choices. Given that entrepreneurs, based on their job environment, have to make their own judgements and cannot follow the approach of others (see also

Shane et al., 2003), this finding makes sense. The ability to make independent decisions is an essential facet of entrepreneurship and regarded as a major pull factor into this profession (i.e., Hessels et al., 2008; Carter et al., 2003).

Interestingly, in this part of the experiment, we do not find the student sample to present the lower bound for cooperation. In most of the rounds the students' behavior resembles that of start-up employees, collaborators and investors (in the last rounds of the game ECIs demonstrate even lower contribution levels than students). This also indicates, that the setting of the conferences (as opposed to the setting in the stationed laboratory) did most likely not provide an experimental context, which threatened the internal validity of our experimental design. This will be discussed in more detail in the limitations section below.

Next, we discuss our findings relating altruism and cooperation to the psychometric variables of entrepreneurial intentions (for student sample only) and entrepreneurial self-efficacy (for both the student and entrepreneurial crowd sample).

4.6.3. Psychometric variables in the context of social preferences

We do not find a relationship between *entrepreneurial intent* and altruistic as well as cooperative tendencies. Students with the intention to start a new venture do not display stronger pro-social behaviors in our sample. Considering this result in combination with the divergent findings observed for entrepreneurs and students in relation to their allocation choices in the dictator and public good game, raises the potential issue of using students as proxies for entrepreneurs in academic research. There are at least two potential reasons for observing students with entrepreneurial intentions to donate significantly less in the dictator game than actual entrepreneurs: (1) Either students scoring high on entrepreneurial intent actually will (or are highly likely to) become entrepreneurs later on in their life (hence there is no problem with the using the questionnaire as such for classifying students as entrepreneurs) but by the time they *actually* are entrepreneurs, they behave differently as to when they were students (i.e., because the context /social norms of the environment changed). This would then raise the discussion of stability of preferences across context and over time. (2) Or there is a problem associated with using entrepreneurial intent questionnaires for classifying students into future job choices.[79] We invite future research to investigate these suggested aspects further.

For the variable of *entrepreneurial self-efficacy* (both business and creative talent), no significant relationship was found for altruism and cooperation in case of the student sample. Hence, we are unable to replicate the findings of Urbig et al. (2012) and Weitzel et al. (2010) in this aspect.

Looking at the influence of *entrepreneurial self-efficacy* onto game behavior for the *entrepreneurial crowd*, a significant impact of business and creative talent onto game behavior is found. However, the impact differs based on game type and sub-sample (i.e., entrepreneurs vs. ECIs) under consideration. For the dictator game, we find *entrepreneurial self-efficacy* to exclusively influence entrepreneurs' behavior in a significant way. Findings are thereby in line with Weitzel et al. (2010) and Urbig et al. (2012). Entrepreneurs' allocation choices in the DG are negatively influenced by their self-assessment of business skills (β=-0.224; p<0.01), while creative skills show a

[79] For an informative overview of using entrepreneurial intent in entrepreneurship as well as other research, please refer to Thompson (2009)

marginally significant positive effect in this context (β=0.08; p=0.068). This finding holds valuable information for policy makers. In line with the discussion of Weitzel et al. (2010), our results imply selfish behavior to be associated with entrepreneurial talent, and that the type of talent (i.e., business vs. creative talent) is thereby of relevance. In particular in contexts fostering entrepreneurial talent/self-efficacy this offers essential input.

In the cooperation game, however, we find neither business nor creative talent to significantly influence entrepreneurs' distribution choices. However, start-up employees, collaborators and investors (ECI) in this context are significantly negatively impacted in their allocation choices by their self-assessed business allocation skills (β=-0.433, p<0.01). We interpret this finding as follows: It appears that entrepreneurs have a better understanding regarding the strategic value of cooperation. However, this understanding is retrieved independently of the business and creative skill set. It would be interesting to investigate in future studies how this understanding originates.

In the following section, we examine and discuss potential limitations of this study.

4.7. Limitations

Some potential shortcomings, such as the imbalanced gender ratio within our professionals' sample, have been discussed in the paper and will consequently not be repeated here. We also outlined (see section 4.3 and 4.4) how various procedures were ensured (i.e., throughout the recruitment process and throughout the experimental sessions), in order to decrease threats to *internal validity*. Nonetheless, we cannot entirely rule out concerns in this context, as *demand effects/social desirability bias* or the *self-selection* into laboratory experiments, which in particular in the framework of social preferences constitute a concern (for an interesting discussion on self-selection into laboratory experiments, see Krawczyk, 2011; Falk et al., 2013; Abeler and Nosenzo, 2015), could play a role in the context of our experiment.

A limitation of our study we want to discuss in more detail is the comparison of data collected in an on-campus laboratory setting (in case of the students) versus data collected via a lab-in-the-field experiment conducted at professionals' conferences. In the case of investigating social preferences, the social context of the experimental situation plays an important role, as individuals might follow different norms and consequently behave differently, based on the given context (Carpenter et al., 2009; Lönnqvist et al., 2011). We were careful in our experimental design as well as in the actual conducting of the experiment, to be as consistent as possible across the two groups. The exact same wording and procedures were used, in order to avoid potential framing effects in this regard. However, due to the fact that the laboratories themselves were embedded in different contexts, we cannot be sure of a social framing effect, or the potential extent thereof. This is the classic trade-off between external vs. internal validity. While it would have been optimal to recreate the exact same laboratory situations, and thereby avoid potential internal validity issues, we would have been unable to access the professionals' sample pool in the same manner. One could argue that the setting of a conference presents an environment more conducive for making "social choices" than the setting of a "classic" decision laboratory, as conferences might induce for example (i) collective or communal feelings. On the other hand, one could argue that a conference setting creates a rather (ii.) competitive atmosphere. Both cases would present a valid threat to the internal validity

of our experimental set-up. However, our data strongly suggests that none of these "special" conference settings occurred.[80]

The sequence of the experimental structure (i.e., eliciting first the preferences and then the psychometric variables) could raise concerns in relation to *order effects.*[81] However, having discussed the pro and contra arguments of running psychological questionnaires before preference measures and vice versa, we decided to first elicit economic preferences and then elicit the traits of personality. We argue that for this setting there is no perfect experimental solution, but rather a decision based on trade-offs. For the purpose of our research, the preference measures (and their comparison across groups) presented the priority. Further, we were concerned that placing the psychological questions before the games could *prime* subjects, in particular as context has been shown to play a strong influence for these types of games.

While the majority of decisions in our experimental design were incentive compatible, the questionnaire required subjects to self-report on certain variables, i.e., the social business variable, but also entrepreneurial self-efficacy (BT and CT) and entrepreneurial intentions. This data hence represents a rather subjective evaluation of, i.e., skill sets. However, while a more objective measure might be desirable this is not an easy or even realizable task (see also Weitzel et al. (2010) for a discussion on this).

We further raise a potential limitation concerning generalizability. As described in section 4.2.2., the *social norms* of an environment play a decisive role for the different manifestations of pro-social behaviors. Gneezy et al. (2016) for example find significantly different cooperative behaviors between fishermen on lakes and fisherman on the sea, based on the different norms of cooperation in these two environments. Future

[80] For the case of (i.): A communal or collective vibe should in particular increase contribution levels in the public good game. However, we find ECIs and students, who are frequently referred to as the lower bound in relation to social preference (Burkes et al. 2009; Falk et al., 2013) to behave very similar in regards to the public good game. For the case of (ii.): We find both entrepreneurs and ECIs to allocate (even in relation to meta studies, see Engel, 2010) considerable amounts in the dictator game, which would have been rather unlikely in a competitive or even hostile environment.

[81] Note, the ordering effects in relation to the games/preferences was dealt with in the paper (section 4.4.). Here, we described how certain mechanisms were implemented (i.e., giving feedback in relation to DG 1 and DG2 only at the end of the experiment) in order to decrease these effects as much as possible. We additionally controlled for this aspect in our analysis.

research would need to establish how pro-social behaviors of entrepreneurs are influenced by social norms, based on i.e., different countries, cultures or simply contexts.

4.8. Conclusion

We find entrepreneurs to be indeed more willing to share and cooperate than start-up professionals and, importantly, than economics and business students.[82] Our findings suggest that standard economic approaches, which pay no or little attention to the influence of social and cooperative attitudes (but rather assume the entrepreneur to act as a self-interested individual with the only objective of maximizing profits), to ignore valuable information, which could help us to better understand the entrepreneur. In particular in relation to their (social) decision-making processes, it seems essential to widen our assumptions. Accounting for the presence of social or other-regarding preferences, such as the willingness to cooperate thereby seems a viable starting point. Gaining insights regarding the complexity of entrepreneurial motivations and preferences can offer important insights for policy makers. In a next step, one should investigate how our findings manifest into the decision-making of entrepreneurs, such as their day to day operations or their long-term strategic planning. Interestingly, we could not establish a relationship concerning the manifestation of social business operations and pro-social allocation choices in the dictator as well as the cooperation game. The findings of our experiment also indicate potential problems of deducting experimental findings sampled from business and economic students to the population of professional entrepreneurs. There appear to be some generalizability issues when using student samples as proxies for entrepreneurs, at least in some contexts. Therefore, researchers should, despite the higher costs[83] and recruitment efforts, venture out into the field to reproduce their results with actual entrepreneurs in order to draw more reliable conclusions.

[82] Future research needs to further investigate the findings obtained in the dictator games in relation to sample size. While past research has investigated stake sizes in relation to contribution behavior, our findings imply that stake sizes might matter more than expected in this regard.

[83] The importance of satiable rewards was confirmed within our experimental proceedings. Using professionals as experimental subjects is expensive but necessary in order to compensate sufficiently for their opportunity costs and to obtain reliable results.

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5. ESSAY NO. IV

The dark triad and its relations to social preferences and (un)productive motives in an entrepreneurial context

Christine Lauritzen

This paper offers four different contributions. While each has its own motivation, they ultimately all contribute towards a better understanding of entrepreneurial decision-making, in particular in relation to social and sustainable choices. Entrepreneurs have been associated with a disposition of socially undesirable personality traits, so-called dark traits (e.g., Akhtar et al., 2013; Wales et al., 2013; Mathieu and St. Jean, 2013). Consequently, the paper investigates the relationships of socially undesirable personality traits (i.e., Machiavellianism, psychopathy and narcissism) onto social preferences (contribution 1), entrepreneurial intentions (contribution 2) and productive and unproductive entrepreneurial motives (contribution 3). It further examines if and how productive and unproductive entrepreneurial motives are related to social preferences (contribution 4). The results suggest a rather weak relationship between dark personality traits and the social preference of altruism. I find exclusively for the trait of Machiavellianism a significant impact on cooperative tendencies. Results further indicate potential future entrepreneurs to be less likely to hold psychopathic tendencies and to be no more, but also no less, inclined to hold narcissistic tendencies than other individuals. The data shows a significant positive relationship between unproductive entrepreneurial motives and the dark traits of narcissism as well as psychopathy. These findings indicate that individuals with higher entrepreneurial intentions are not characterized by personality traits, which can systematically be linked to unproductive entrepreneurial motives.

5.1. Introduction

In this paper, I offer four different contributions. While each has its own motivation, they ultimately all contribute towards a better understanding of entrepreneurial decision-making, in particular in relation to social and sustainable choices. The paper investigates the relationships of socially undesirable personality traits (Machiavellianism, psychopathy and narcissism) onto *social preferences* (altruism and cooperation) (contribution 1), *entrepreneurial intentions* (contribution 2) and *productive and unproductive entrepreneurial motives* (contribution 3). It further examines if and how *productive* and *unproductive entrepreneurial motives* are related to *social preferences* (contribution 4).

In particular for an entrepreneurial context, it is valuable to understand whether socially undesirable personality traits, so-called *dark traits*, are more prominent in individuals intending to start an entrepreneurial venture, as has been suggested in the entrepreneurship literature (e.g., Akhtar et al., 2013; Wales et al., 2013; Mathieu and St. Jean, 2013). In case of observing individuals with high entrepreneurial intentions to be more strongly characterized by dark personality traits, the logical next step would be to understand how this manifests into their social and (un)productive decision-making. I contribute here by analyzing the association of *dark traits* onto *social preferences* as well as *productive* and *unproductive entrepreneurial motives* following the approach by Hmieleski and Lerner (2016).

While traditional economic models assume individuals to be rational, self-interested decision-makers, we know from multiple studies in the field of behavioral or experimental economics that individuals clearly deviate from this assumption. Scholars have suggested that a potential factor driving behavioral heterogeneity in economic games is the influence of *personality* (see e.g., Almlund et al., 2011; Becker et al., 2012; Borghans et al., 2008). The question whether the personality of the player is relevant for game behavior is an interesting one, because should heterogeneous behavior in games be understood via the influence of psychological constructs, it would be easier to interpret the given results, especially within a psychological context, and would potentially allow us to make better or broader behavioral applications (see also Zhao and Smillie (2015)

for a discussion on this). I contribute to this stream of literature by empirically investigating the impact of the *dark triad* of personality, consisting of the traits of *narcissism, Machiavellianism* and *psychopathy* (Jonason and Webster, 2010), onto the behavior in the *dictator game* (Forsythe et al. 1994), as well as in a two-player *public good game* (Leydard, 1995).[84]

Over the past years, the *dark triad* of personality has found increasing attention in the field of *occupational choice* and *organizational behavior*, as personality is likely to play a decisive role in operational decision-making. Research has thereby focused in particular on the traits of corporate leaders and managers (e.g., Babiak and Hare, 2006; Rosenthal and Pittinsky, 2006; Babiak, et al., 2010; Chatterjee and Hambrick, 2007), most likely driven by the increasing problem of white-collar crime (Benson and Simpson 2009). However, also in the field of entrepreneurship there has been a growing interest regarding the influence of dark traits onto entrepreneurs and how these traits might affect the behavior of entrepreneurs, such as their social, sustainable, and economical decision-making (Hmieleski and Lerner, 2016; Miller, 2014; DeNisi, 2015; Shepherd et al., 2013; Webb et al., 2009). Within this context, Klotz and Neubaum (2015) explicitly encourage entrepreneurship scholars to investigate the role of the *dark triad* of personality (p.9) so as to better understand the potential downside of entrepreneurial personalities, in particular regarding their effect or interaction with entrepreneurial outcomes. I contribute to this stream of literature, in an identical manner to Hmieleski and Lerner (2016), by experimentally analyzing the link between the *dark triad* and *entrepreneurial intentions*.

Furthermore, in order to gain a better understanding of how the prevalence of dark personality traits might impact social and sustainable decision making of entrepreneurs, I measure subjects' *productive* and *unproductive entrepreneurial motives* (Hmieleski and Lerner, 2016). Hereby, I am particularly interested in observing how individuals with

[84] We thereby focus exclusively on the role of personality traits and exclude other psychological concepts, such as behavioral activation system (BAS) (see Scheres and Sanfey, 2006) or cognitive ability/intelligence (see e.g., Proto and Rustichini, 2014; Putterman et al., 2011; Samson and Kostyszyn, 2015). In particular cognitive ability is frequently collected as additional explanatory variable (e.g., Kagel and Mc Gee, 2014; Jones 2008; Burks et al. 2009; Ben-Ner and Kramer 2011; Ben-Ner et al., 2008) within this stream literature, as it is debated as to whether cognitive ability should be regarded as independent of personality or an integrated component of it (compare e.g., Borghans et al. 2008; Rustichini et al. 2016; De Young, 2011).

high entrepreneurial intentions score on the scale of the *dark triad* and whether these traits have a significant impact on *productive* or *unproductive entrepreneurial motives*.

Given the ever-increasing environmental issues on our planet, its limited natural resources in combination with an increasing world population, I believe entrepreneurship to play a major role on how and whether we are going to tackle these pressing problems. Thereby, our planet and our society desperately need entrepreneurs with *productive* entrepreneurial motives, willing to create sustainable value for society rather than exclusively for themselves. Understanding the link between (dark) *personality traits* and *entrepreneurial intentions* as well as between *personality traits* and *entrepreneurial motives* can therefore offer us valuable insights. In particular for governmental policy this information might allow for an effective setting of incentives, so as to induce more sustainable and mindful venturing.

A further contribution of the paper is provided by investigating the link between *productive and unproductive entrepreneurial motives* and the *social preferences* of altruism and cooperation. A better understanding of the connection between these two constructs gives us valuable insights as to how interpret findings. This holds for *both* measures, i.e., can productive entrepreneurial motives be interpreted with altruistic concepts? And vice versa, can we get an indication as to what altruistic or cooperative preferences exactly measure in an *entrepreneurial motive* context?

To explore these relationships, I analyze the data of N=62 business and economics students from Berlin, who played incentivized economic games –the dictator game (Forsythe et al., 1994) for the case of altruism, and a 2-player public good game (Ledyard, 1995) for the case of cooperation. I additionally collected data on entrepreneurial intentions (Chen et al., 1998), the dark triad (Paulhus and Williams, 2002), and entrepreneurial (un)productive motives (Hmieleski and Lerner, 2016).

Investigating the association of the dark triad and social preferences (contribution 1), I find exclusively for the trait of Machiavellianism a significant impact on cooperative tendencies. Considering the dark triad in the context of occupational choice (contribution 2), I find the traits of psychopathy and Machiavellianism to significantly influence entrepreneurial intentions, albeit in opposite directions. Interestingly, I find individuals

with high entrepreneurial intentions to exhibit significantly lower levels of sub-clinical psychopathy. Relating the dark triad to entrepreneurial motives (contribution 3), I find a significant positive relationship of both psychopathic and narcissistic tendencies onto unproductive entrepreneurial motives. Combining the last two findings, it appears that individuals with higher entrepreneurial intentions are generally not characterized by dark personality traits, which can systematically be linked to unproductive entrepreneurial motives. Given the societal and environmental pressures on our planet, this is deemed good news.

The paper proceeds as follows: Section 2 outlines the theoretical background and relevant literature for linking personality traits and preferences. It describes the theoretical background of the dark triad and its application in relation to (social) preferences. In section 3, I summarize research linking the dark triad of personalities to the occupational choice of entrepreneurship. Both sections close with formulations of hypotheses based on the relevant literature. Section 4 describes our sample, the experimental design and its measures. Section 5 presents the empirical analysis. Section 6 discusses the findings, provides the study's limitations and outlines potential for future research.

5.2. Theory and Literature: Personality Traits and Economic Preferences

Researchers, proposing a systematic link between behavioral heterogeneity in economic games and personality traits, have developed economic models of personality (Almlund et al., 2011; Borghans et al., 2008; Ferguson et al., 2011; Becker et al., 2012). These models look not only at the *direct* link between personality and preferences, but also try to determine whether preferences and personalities act as complements or substitutes in predicting certain life outcomes, such as life satisfaction (Becker et al., 2012). However, research in this field is still rather at the beginning, and the link between personality and social decision-making is currently far from robust. Also, due to their centrality within personality research, studies linking preferences to personality traits have been strongly based around the personality constructs of the BIG 5 and its extended version HEXACO, which additionally includes the honesty-humility dimension (e.g., Ben-Ner et al., 2004a; Ben-Ner et al. 2004b; Ben-Ner et al., 2008; Ben-Ner and Halldorsson, 2010; Brandstätter and Königstein, 2001, Hilbig and Zettler, 2009; Thielman and Hilbig, 2014; Hilbig et al., 2012; Hilbig et al., 2015; Becker et al., 2012;

Baumert et al. 2014; Al-Ubaydli et al., 2016; Brocklebank et al., 2011; Kurzban and Houser, 2001; Lönnqvist et al., 2011; Perugini et al., 2010; Pothos et al., 2011; Skatova and Ferguson, 2011). Thereby, the focus has been particularly on traits, which given their definition, are related to (anti)-social or cooperative behaviors, such as agreeableness and extraversion (e.g., Brandstätter and Königstein, 2001). However, other types of personality beyond the BIG 5, such as locus of control, sensation seeking, Type A behavior, or self-monitoring have also been investigated in this context (e.g., Becker et al., 2012; Boone et al., 1999; Kurzban and Houser, 2001).

Zhao and Smillie (2015) discuss the relationship of personality traits onto behavioral heterogeneity in games based on *situational factors*. The authors argue that depending on whether the decision situation is characterized as "weak" or "strong", personality traits play more or less of an influence in the given decision-making context. They classify the dictator game as a weak situation, on the premise that there is no veto power of the counterparty. The authors argue that in these weak or ambiguous situations the role of personality in predicting behavior is more pronounced than in strong situations (Zhao and Smillie, 2015). Hence, the type of game under investigation might play a role when analyzing the relation between personality traits and preferences, as motivations and preferences are likely to be different, depending on game type (see also Charness and Rabin, 2002). It is hence valuable to consider a range of games within this context (Broklebank et al., 2011). I contribute here, by analyzing whether the observed behavior is consistent across the dictator and public good game.

There have been concerns regarding methodological complications within this research field, leading possibly to measurement problems and confounding factors, causing diverse, unstable or hard to interpret findings. While some of these problems arise due to the interdisciplinary work of economics and psychology, others are independent of it. Within this context, the problem of diverse elicitation methods in relation to preferences has been raised. This is not exclusively a problem of interdisciplinary work, as even within the field of economics there are various methods for eliciting data reflecting altruistic tendencies, such as the *strategy method* (Selten, 1965; Fischbacher et al., 2001) and the classic dictator game (Forsythe et al., 1994) (see also Brandts and Charness, 2011). Analogous, in the field of psychology different versions of questionnaires are used for measuring the same personality trait construct, i.e., for

narcissism using the Narcissistic Personality Inventory (NPI, Raskin and Hall, 1979) or NPI-16 (Ames et al., 2006). Comparability of studies can thereby become a problem. Other measurement issues arise due to the diverse framings of decision situations (i.e., hot vs. cold methods), different scales of payout[85] or no real payoffs at all but rather hypothetical payoffs (mainly, but not exclusively done by psychology scholars). This is problematic, as one might potentially compare subjects, who in the case of hypothetical payoffs, answered in a way they believed to be socially desirable, to subjects, who are more sensitive to potential rewards. The last point is in particular relevant, as behavioral game theory is strongly influenced by the factor of *social desirability* (Fleming and Zizzo, 2011). Finally, also the role of culture is a noteworthy factor to be considered when comparing results across studies, something I consider in more detail when comparing my results to those of Hmieleski and Lerner (2016).

As a consequence, I exclude in the literature overview studies using *psychological* elicitation methods of social preferences, such as i.e., the *social value orientation scale* (van Lange et al., 1997) or other *self-reports* on altruism or social behavior, including volunteering (e.g., Oda et al., 2013; Rushton et al., 1981; Carlo et al., 2005; Krueger et al., 2001; Bekkers, 2007; Evan and Revelle, 2008; Erez et al., 2008), as the problem here is not only to find a sound basis on which to compare these different methods of elicitation, but also one of missing incentivization to reveal true preferences. In relation to the dark traits of personality, I include in the following overview exclusively studies, which measure traits at a *sub-clinical* level and perform the experiment solely with non-clinical subjects.[86]

Interesting new research, which investigates the relationship between measures elicited by economists (via revealed preferences) and psychologists (via questionnaires) is done by Bönte et al. (2017). The authors empirically investigate the relationship between behavioral competitiveness (via economic measures) and self-reported competitiveness (measured with tools from psychology). Their findings propose that economic and psychological measures do share a common conceptual ground. This would

[85] See Camerer and Hogarth (1999) on a discussion of different financial incentives in experiments.

[86] Excluding studies performed with individuals who are currently under clinical or forensic supervision (e.g., Koenigs et al., 2010; Mokros et al. 2008).

mean that economic experiments may help to assess personality measures and in turn personality concepts could improve our understanding of economic behavior. However, the authors also point out that motives and context matter within this framework. In the case of competitiveness, the authors find that it is in particular for the decision-making of individuals with neurotic tendencies important to know whether the competition provides additional benefits (beyond simply competing as measured in economic experiments), such as the potential for personal development (i.e., measured in psychometric studies). Hence, the failure to account for such nuances may well lead to missing important information or result in mixed, inconclusive findings (Bönte et al., 2016).

Next, I outline in detail the theoretical background of the dark triad of personality, describe its theoretical origins, and its individual traits in more detail. I then discuss how Machiavellianism, psychopathy, and narcissism have been linked to social preferences as well as to occupational choice, using the case of entrepreneurship. For a detailed theoretical background of social preferences, in particular in relation to altruism and cooperation, and their elicitation via a revealed preference approach, please refer to Lauritzen et al. (2020).

5.2.1. The dark triad of personalities

The *dark triad* is a term used to describe the constellation of three malignant personality traits: *Narcissism, Machiavellianism,* and (sub-clinical) *psychopathy* (Paulhus and Williams, 2002). It has been developed by the Canadian psychologists Paulhus and Williams (2002), and has in particular in the last few years received increasing attention. Essentially, these traits share the underlying component of dishonesty, manipulation in pursuit of selfish gains, and lack of empathy and morality (Paulhus and Williams, 2002). They have been linked to behaviors such as stealing, fraud, cheating, gaining at the costs of others (Babiak et al., 2006; Hare, 1999; Williams et al., 2010), limited affective empathy (Jonason et al., 2013; Jonason and Krause, 2013), and as lacking "altruistic or prosocial ideals" (Hmieleski and Lerner, 2016, p. 9). Beyond this element of "callous-manipulation" (Jones, 2013, p. 563) however the traits present distinct constructs (Paulhus and Williams, 2002; Vernon et al., 2008; Rauthmann, 2011). In general, women have been shown to score lower on the dark triad than men (Jonason and Webster, 2010). Studies find a significant positive relationship between the dark triad and impulsivity as

well as sensation seeking (Crysel et al., 2013), a favoring of short-term relationships (Jonason, et al. 2012), counterproductive behaviors (O'Boyle, Forsythe, Banks and McDaniel, 2012), and selfish financial decision-making (Jones, 2013; Jones, 2014). Different measures of this construct are available. Most popular are thereby the so-called *dirty dozen* (Jonason and Webster, 2010), applied in our study, and the *short dark triad* (SD3) (Jones and Paulhus, 2014). For an interesting review regarding the dark triad's development, elicitation, and general results, as well as a discussion in regards to "nature vs. nurture", please see Furnham et al. (2013).

The dark triad has been studied in a wide range of context, such as mating behavior[87] (Jonason et al., 2011; Jonason et al., 2010; Paulus and Williams, 2002; Jones and Paulhus, 2011); educational contexts[88] (Williams et al., 2010; Nathanson et al., 2006), and interpersonal relationships[89] (Zuroff et al., 2010). Two other environments in which the dark triad has been studied, and which are central for the purpose of this paper, are that of (anti)-social behavior and the workplace. Research from this field is in detail summarized in section 5.2.2. and section 5.3 respectively.

Next, I outline the three individual traits underlying the dark triad and their theoretical backgrounds in more detail.

5.2.1.1. Psychopathy

Psychopaths have generally been described as individuals with manipulative behavior, superficial charm, sensation and risk seeking, an inclination to violate social norms, impulsivity, and lacking empathy (Hart et al.,1994; Hare, 2006; Newman et al., 1987; Patrick et al., 2005). However, at the same time, people with elevated levels of psychopathy might demonstrate positive attributes such as being charming, entertaining and intelligent (Akhtar et al., 2013). Several instruments have been developed to measure psychopathy. In the two-factor model, the first factor describes *primary psychopathy*,

[87] Demonstrating a generally short-term, impulsive mating style (Jones and Paulhus, 2011), and poaching partners from others (Jonason et al., 2010).

[88] Thereby, demonstrating high levels of cheating, plagiarism and unduly claiming credit. (Williams et al., 2010, Nathanson et al., 2006).

[89] While all concepts have in common the component of ruthless self-advancement (Zuroff et al., 2010), the individual measures of the dark triad are related to distinctive personality styles.

comprising affective and interpersonal traits such as selfishness, callousness, lack of empathy and guilt (see Levenson et al., 1995). The other factor, *secondary psychopathy*, measures more behavioral (e.g., risk-taking) components and an anti-social lifestyle (see Hare 1991, 2006; Hare and Neumann, 2006). The later factor is also responsible for the propensity of psychopaths to engage in violent or illegal behaviors (Stevens et al., 2012).[90]

5.2.1.2. Narcissism

Narcissism is a pathological form of self-love (Freud, 1957[1914]). It measures constructs, such as obsessive attention seeking, grandiosity, vanity, self-focus, egotism, and exploitativeness in relationships (Emmons, 1987; Millon and Davis, 1996). Narcissists have inflated views in a variety of self-regarding concepts, such as their creative abilities, their cleverness, and their looks. Interestingly, this view does not hold in regards to moral and caring tendencies (Campbell et al., 2002). They further have a strong tendency to blame others for underperformance or personal failure (Campbell et al., 2000; Gosling et al., 1998). Narcissism has been linked to several other personality traits including sensation seeking (Emmons, 1981), creativity (Raskin and Hall, 1980), and extraversion (Emmons, 1984). An established scale to measure narcissism in individuals is the Narcissistic Personality Inventory (NPI, Raskin and Hall, 1979). Emmons (1984, 1987) discovered four distinct factors describing the construct of narcissism within the NPI, which he categorized as *exploitativeness/entitlement*, *leadership/authority*, *superiority/arrogance*, and *self-absorption/self-admiration*. Narcissistic individuals, due to their overconfidence and excessive levels of optimism in their own regard (Paulhus and Williams, 2002, Campbell Goodie and Foster, 2004), like to engage in risky behaviors or decision-making (Campbell, 2004), believing they can beat the odds while downplaying potential consequences (Lakey et al., 2008).

5.2.1.3. Machiavellianism

Out of the dark triad Machiavellianism is the only trait not derived from a personality disorder. Christie and Geis (1970) were one of the first researchers interested in measuring and studying Machiavellianism (MACH), which got its name from the renaissance politician and philosopher Niccolò Machiavelli. Since then, their well-known

[90] Cooke and Michie (2001) later expand this by a third factor namely interpersonal, affective and lifestyle.

MachIV scale has been used and validated in numerous studies (see e.g., Gunnthorsdottir et al., 2002). People scoring high on "MACH" have been described as manipulative and deceptive, promoting their self-interest even at the cost of exploiting others (Barnett and Thomson, 1985). Studies suggest that individuals scoring high on MACH are more risk seeking than their low scoring counterparts. However, in contrast to individuals high on psychopathy, high MACHs thereby do not take needless risks (Jones, 2013). High MACHs are more prone to lie (Allsopp et al., 1991). Machiavellianism does not correlate with any measure of standardized intelligence (Wilson et al., 1998), income, or status (Hunt and Chonto, 1984). Interestingly, Machiavellianism is not linked to impulsivity but is rather of strategic, cautious nature (Jones, 2013) - for example, engaging in anti-social behavior only when there is little risk of being caught (Cooper and Peterson, 1980). This might explain why people scoring high on MACH are often seen as more likeable than low MACHs (Wilson et al., 1998). Individuals scoring high on Machiavellianism have issues establishing long term relationships, as they expect their own level of selfishness, in particular in relation to reciprocity, to be present in other individuals (Jones, 2014). They take without giving in return (Ermer and Kiel, 2010) and are known for their strong desire to win at all costs, even at the expense of others (Buckels et al., 2013; Cote et al., 2011). In addition, they prefer to gamble with the money of other parties (Jones, 2013) and have strong emphasis on short-term advances (Jonason and Trost, 2010). Cote et al. (2011) and Hmieleski and Lerner (2016) describe the tendency of high MACHs to not reciprocate in social exchanges once there are no more future benefits to be expected from the counterparty, or once their own goals have been achieved. Winning is thereby of centrality within their motivation structure (Jonason and Trost, 2010).

After having outlined the three traits of the dark triad, I next summarize research dealing with these personality traits in the *social preferences* literature.

5.2.2. The dark triad and social preferences

Given the definitions of the dark triad in combination with the theoretical underpinnings of social preferences,[91] in particular those of altruism/fairness and cooperation, it is somewhat reasonable to expect a negative relationship between the dark triad and social preferences.

[91] For a theoretical review of social preferences, please refer to Lauritzen et al. (2020).

In the following sections, I outline studies which have investigated these relationships in depth. Out of the three traits, Machiavellianism has received the most attention, in particular in relation to trust games, closely followed by psychopathy. The least amount of research is found with regards to narcissism and preferences.

5.2.2.1. Machiavellianism and social preferences

Meyer (1992) analyzed the relationship between Machiavellianism (MachIV, Christie and Geis, 1970) and two types of hypothetical ultimatum games.[92] The findings show below average MACHs to reject unfair offers more often than high MACHs in the strong bargaining condition, while no significant differences were found in the weak bargaining condition. The findings propose fairness considerations to be rather negatively correlated with Machiavellianism, and since these types of considerations have strongly been linked to behaviors in the dictator game (e.g., Kahneman et al., 1986; Rabin, 1993; Fehr and Schmidt, 1999), they suggest a negative relationship between allocation choices in the dictator game and Machiavellianism. Gunnthorsdottir et al. (2002) research how Machiavellianism influences behavior in a $10 trust game. The authors argue that individual differences in trust and reciprocity might be driven by personality traits as *decision heuristics*, often driven by emotions, and that these might play an important role within the context of economic games. People scoring high on dark personality traits, such as Machiavellianism, are generally described by a rather cool affect, i.e., lower levels of emotional arouse-ability and less bound by social norms. Based on this, these individuals are argued to be more likely to cheat or non-reciprocate in economic games, and to behave in a way that reflects their personal interests, even if that means exploiting the counterparty (see also Lykken, 1995; Frank, 1988; Hirschleifer, 1987 for similar arguments). Gunnthorsdottir et al. (2002, p.56) hypothesize:

"High Machs with their cool rational attitude should be true gamesmen, and better than Lows at going after their short-term self interest in anonymous and finite interactions."

[92] The first being a standard one-shot ultimatum game, the other a repeated, modified ultimatum game.

While the authors find no significant difference regarding the trusting behavior in the game, they find individuals scoring high on Machiavellianism to defect on reciprocal behavior, by playing the dominant strategy in the second stage of the trust game. Burks et al. (2003) have a very similar experimental set-up to Gunnthorsdottir et al. (2002). Their findings however are rather contradictory: they find that the MACH scale "[…] predicts distrust but not lack of trustworthiness […]." (Burks et al. 2003, p. 195) and hence a negative association between Machiavellianism and the amount transferred by the trustor ($p<0.01$). They find no significant effect for the relationship between Machiavellianism and the trustee. Ben-Ner and Halldorsson (2010) also analyze the relationship between Machiavellianism and behavior in the trust game, they find a significant but weak correlation between Machiavellianism and the amount sent back by the trustees ($r=-0.18$; $p<0.10$).[93] The relationship however becomes insignificant when controlling for the *Big Five* as well as demographic factors. The findings of these studies show that the relationship between Machiavellianism and behavior in the trust game is far from clear or straightforward. Wilson et al. (1998) identify low-MACH individuals as being more cooperative, while high-MACHs display a rather exploitative nature.[94] Berg et al. (2013) analyze in their study the relation between the *dark triad* and various hypothetical[95] economic games (a dictator game, a ten-round prisoner's dilemma game and an ultimatum game). In the dictator game, the authors find all three traits to positively correlate with the amount retained by the dictator ($p<0.001$ for Machiavellianism and psychopathy; $p<0.01$ for narcissism). In the ultimatum game, rejection rates are also positively correlated with psychopathy and Machiavellianism, and in the prisoner's dilemma game defections are positively correlated with Machiavellianism and psychopathy ($p<0.001$).

Based on the discussed findings, I next formulate my hypotheses in relation to the personality of Machiavellianism and the elicited behavior in the games.

[93] The authors do not analyze the relationship between MACH and the amount sent back.

[94] The authors experimentally investigate the relationship between Machiavellianism and cooperation via the story-telling method.

[95] Hypothetical in terms of partner and incentive payout.

HYPOTHESIS 1 a: *I expect a negative association between the trait of Machiavellianism and the amount allocated by the dictator to the receiver.*

HYPOTHESIS 2 a: *I expect a negative association between the trait of Machiavellianism and the initial willingness to cooperate in the first round of the public good game.*

I further investigate the association between the dark triad and cooperative tendencies *over time* (rounds) in the *public good game*. We know from past research, that contribution levels in the public good game generally decline over time, as the strategic value to cooperate declines (e.g., Fischbacher et al., 2001). Because Machiavellianism is, based on its theoretical foundations, in particular characterized by strong competitive and strategic concerns, focusing on short-term gains (Jonason and Trost, 2010) also in relation to reciprocity (Jones, 2014), it is in particular interesting to observe how high MACHs compare to low MACHs in this context. Based on the outlined theoretical foundations, I expect a negative relationship between the contribution levels in the public good game over time and Machiavellianism, as the strategic value of cooperation declines. In the following, I formulate my hypothesis in relation to Machiavellianism and cooperation over time.

HYPOTHESIS 3: *I presume that the willingness to cooperate in later rounds of the public good game is significantly lower among high MACH individuals, as the strategic value of cooperation declines over time.*

5.2.2.2. Psychopathy and social preferences

Rilling et al. (2007) analyze the behavioral, emotional and neural correlates of psychopathy in a repeated prisoner's dilemma game.[96] The authors find, controlling for gender, a negative correlation of psychopathy and cooperative behavior ($p<0.05$) within the male subject pool. Jones et al. (2013) find a positive association between psychopathy and the tendency to gamble with other people's money (however, no association was found when gambling with one's own money) even in situations of certain losses. Osumi

[96] Whereby individuals actually played against the computer, which was fixed to play a forgiving tit-for-tat-strategy.

and Ohira (2010) elicit psychopathic tendencies and let subjects play an incentivized ultimatum game.[97] The authors find a positive relationship between primary psychopathy and the acceptance of unfair offers ($p<0.01$). Curry et al. (2011) investigate the role of psychopathy in three types of prisoner dilemma games (simultaneous discrete, simultaneous continuous and sequential discrete) and a standard ultimatum game. They find psychopathy leading to lower levels of cooperation, while the effects in the bargaining game are diverse.[98]

Given these results, which report a rather negative association between psychopathy and other-regarding preferences, I devise my hypotheses in this regard as follows:

HYPOTHESIS 1 b: *I expect a negative association between the trait of (a) psychopathy, and the amount allocated by the dictator to the receiver.*

HYPOTHESIS 2 b: *I expect a negative association between the trait of (a) psychopathy, and the initial willingness to cooperate in the first round of the public good game.*

5.2.2.3. Narcissism and social preferences

The least amount of research, linking the traits of the dark triad to social preferences, is found with respect to narcissism. Thereby, the study by Berg et al. (2013) was already discussed in section 5.2.2.1.: Findings report a positive and significant relationship with respect to the dictator game ($r=0.19$, $p<0.01$) as well as the ultimatum game, but only in the condition where the proposer offered 30% of the endowment ($r=0.17$; $p<0.05$). To the best of my knowledge, the only other study investigating this context further is by Campbell et al. (2005). The authors examine in an empirical study the social cost of narcissism via a social dilemma situation (based on the commons dilemma by Hardin, 1968). They find narcissistic individuals to not only display higher

[97] The design is inspired by Koenigs and Tranel's (2007) version, where the proposer does not really exist.

[98] The Machiavellian egocentricity scores were negatively associated with cooperation in the simultaneous prisoner dilemma games and lower levels of reciprocating or initiating cooperation in sequential prisoner's dilemma games. Machiavellian egocentricity was positively associated with higher offers in the ultimatum game

desires for profits than non-narcissists, but also that the commons were faster exploited and ruined when narcissists were involved. They conclude that "In the context of a resource dilemma, narcissism confers a benefit for the self but a longer-term cost to others and to the commons." (Campbell et al., 2005, p. 1367).

Based on the presented research studies, as well as the theoretical background of both the dark triad of personality and social preferences, I propose the following hypotheses with respect to narcissism:

HYPOTHESIS 1c: *I expect a negative association between the trait of narcissism and the amount allocated by the dictator to the receiver.*

HYPOTHESIS 2 c: *I expect a negative association between the trait of narcissism and the initial willingness to cooperate in the first round of the public good game.*

After having outlined the literature of the *dark triad* and its relations to *social preferences*, I next describe literature relating the *dark triad* to *occupational choice*, thereby focusing on entrepreneurship. However, as research in this area is somewhat limited, I also take into account research from the field of organizational behavior, specifically from the leadership literature, as past research has established leadership to be an essential factor of entrepreneurial activity (see e.g., Hemmen et al., 2012; Felix et al., 2019).

5.2.3. The dark triad and occupational choice for the case of entrepreneurship

Personality research is nothing new in the field of entrepreneurship. Research from this domain includes, but is not limited to, risk propensity (Burmeister-Lamp et al., 2012; Steward and Roth, 2007, Koudstaal et al., 2016), the five-factor model (Zhao and Seibert, 2006; Rauch and Freese, 2007), need for autonomy (Rauch and Freese, 2007), self-efficacy (Chen et al., 1998; McGee et al., 2009), (over) confidence (Koellinger et al., 2007; 2013), and locus of control (Rauch and Freese, 2007; Mueller and Thomas, 2001). For a comprehensive overview, see Brandstätter (2011). However, more recently researchers, such as Klotz and Neubaum (2016), have discussed the conceptualization of

personality traits within entrepreneurship research, thereby highlighting the importance to increase research with regards to dark traits. The authors explicitly encourage researchers to consider the traits of Machiavellianism, psychopathy, and narcissism and to investigate how these might affect or interact with entrepreneurial outcomes (Klotz and Neubaum, 2016).

Trait theoretical backgrounds that potentially explain why (if) entrepreneurs are different to other people in relation to their personality structure can be found in Judge et al. (2009). The authors outline and review three different theoretical approaches within the trait approach, namely (1) *evolutionary theory* and *evolutionary psychology*, (2) *behavioral genetics* and (3) *socio-analytic theory*. Evolutionary theory and evolutionary psychology provide a theory for the existence of personality traits (namely a process of mutation and selection) as well as the efficacy of certain traits.[99] Evolutionary theory posits that certain traits are more evident in some people, as they equip them with some type of advantage. This approach would hence provide one potential reason for the argument that entrepreneurs are different to other people in regards to their personality structure - namely that the traits they have been endowed with encourage and support them in the profession of being an entrepreneur, due to the better personality-environment match. Hmieleski and Lerner (2016) draw on *life history theory*[100] as well as *social exchange theory*[101] for evaluating the relationship between dark traits and becoming an entrepreneur. Other theories that have been applied in order to explain why and how individuals with certain values, needs and personality structures select themselves into the vocation of entrepreneurship are *career choice theory* (Holland, 1997), *person-environment fit theory* (Judge and Kristof-Brown, 2004), and *contingency theory* (Carsrud and Johnson, 1989).

[99] Thereby, the traits that would support an individual to become an entrepreneur are not necessarily the same as the ones that help you to be an effective entrepreneur.

[100] This theory provides a framework as to how individuals, faced with certain trade-offs, should make allocations with respect to time and energy towards assignments and traits, so as to optimize their well-being (see e.g., Del Giudice et al., 2016).

[101] Emerson (1976), describes it as a frame of references, rather than a theory and states: "As I see it, its scope is defined by an assumption: that a resource will continue to flow only if there is a valued return contingent upon it. Psychologists call this contingent return *reinforcement* - economists simply call this reciprocally contingent flow *exchange."* (p.359)

Over recent years, there has been an increasing stream of literature dealing with socially undesirable personality traits, often referred to as *"dark traits"*, in the corporate and leadership literature in general (e.g., Babiak and Hare, 2006; Rosenthal and Pittinsky, 2006; Babiak et al., 2010; Chatterjee and Hambrick, 2007), but also within entrepreneurship research (Miller, 2014; DeNisi, 2015; Klotz and Neubaum, 2016; Hmieleski and Lerner, 2016). These studies investigate the potential facets of dark personality traits and discuss their implications in relation to moral and ethical decision-making. Thereby, Vallaster et al. (2019) offer a comprehensive literature review in regards to entrepreneurship and ethics, and Dickel and Graeff (2018) in relation to entrepreneurship and corruption. The growing interest for this field of research is most likely driven by the increasing problem[102] of corporate or white-collar crime (Benson and Simpson, 2009). But it is clearly also for the field of entrepreneurship highly relevant to understand the association of personality and entrepreneurial behavior, as their decision-making has a large societal impact.

I am interested in observing how individuals with high entrepreneurial intentions score on the scale of the dark triad and further, whether these traits have a significant impact on productive or unproductive entrepreneurial motives. I thereby replicate the approach by Hmieleski and Lerner (2016). Given the environmental pressures on this planet, our society desperately needs individuals with *productive* entrepreneurial motives, such as the willingness to create sustainable value for society rather than exclusively for oneself, to self-select themselves into the vocation of entrepreneurship. Understanding the link between (dark) *personality traits* and *entrepreneurial intentions* as well as between *personality traits* and *entrepreneurial motives* could offer us valuable insights in this regard.

Within this context, it is certainly also important to critically acknowledge what a significant relationship between entrepreneurial intentions and dark personality traits implies about the culture of our society. Following the argumentation of *life history theory*, it suggests that in order to succeed in an entrepreneurial environment, individuals

[102] The debate, whether white-collar crime actually increased or became simply more transparent/public, albeit an interesting one, is beyond the scope of this paper.

need to select behavioral strategies characterized by socially undesirable, exploitative, deceptive, manipulative, and generally malignant behaviors. The effects of this, on so many levels, hold destructive potentials. I argue that this notion presents a challenge our society urgently needs to address and rethink in order to move towards a more social and sustainable entrepreneurial and business culture. Thereby, governmental policy could, via offering the right incentives, play an important role.

It is important to highlight that when talking about dark traits or even psychological disorders, such as psychopathy, the focus in this paper is evidently on individuals who manage these forms of personality successfully. So, while exhibiting these "dark" behavioral tendencies, they still manage to achieve (professional) success in real life. The literature thereby distinguishes between two different ways of success. On the one hand, success is used to describe the event, where an individual, exhibiting i.e., psychopathic tendencies, manages to avoid being institutionalized (Mullins-Nelson et al., 2006), while the other approach focuses on individuals who achieve *professional success* despite (or maybe even because) of their psychopathic tendencies. (e.g., Babiak and Hare, 2006; Lykken, 1995). Research has thereby established that individuals with a psychopathic personality disorder can be found in all kinds of employment positions: in boardrooms (Babiak and Hare, 2006; Babiak et al., 2010), in politics (Lilienfeld et al., 2012; Dutton, 2016), but also in blue collar work (Palmen et al., 2018). These studies outline why and how these individuals manage to stay in their jobs, often very successfully so. Similar research can be found for the trait of narcissism. Chatterjee and Hambrick (2007) for example investigate the influence of CEO's narcissism onto company strategy and performance.

However, the line between bright and dark traits can be far from clear. Danny Miller (2014) describes the "Janus-faced" character of an entrepreneurial personality, namely the way a positive or bright character trait, such as *need for achievement* can, when taken to the extreme end of the scale, turn into a negative or dark trait (i.e., aggressiveness or ruthlessness). Judge et al. (2009) outline in a similar manner, albeit within the context of leadership, how bright (dark) traits, while mainly leading to positive (negative) implications, can also under certain circumstances or at extreme levels have negative (positive) implications for both leader emergence and effectiveness. Baibak et al. (2010, p.192) argue that "[…] psychopathy is more strongly associated with style than

with substance." The authors discuss that while these individuals often exhibit sub-optimal performances and management styles, due to the interpersonal problems caused by the erratic side of their psychopathic behavior, the positive sides of psychopathic behavior, such as being charismatic, lead to successful impression management and strong presentation abilities that manage to hide or at least obscure insufficient performances, and hence keep executives in their position. Similar conclusions have been made in the leadership literature in relation to the personality trait of narcissism. Again, while this trait holds positive aspects in relation to leadership, such as charisma, creativity, drive for innovativeness, commitment, and vision (Rosenthal and Pittinsky, 2006; Campbell et al., 2011; Deluga, 1997; Maccoby, 2004; Wales et al., 2013), there are also considerable problems attached to narcissism in relation to successful leadership, such as the violation of integrity, discriminating sub-ordinates (Rosenthal and Pittinsky, 2006), and the reluctance to acknowledge mistakes (de Vries and Miller, 1985).

In the following, I review literature evaluating how the characteristics of the dark triad match well with the oftentimes stressful requirements of an entrepreneurial environment.

Concepts of the dark triad, or by definition closely related to it, which have been researched in the context of entrepreneurship include greed and hubris[103] (Haynes, Hitt and Campbell, 2015; Hayward, Shepherd and Griffin, 2006[104]), behavioral disinhibitions (Lerner, 2016), sub-clinical psychopathy (Akhtar et al., 2013; Hmieleski and Lerner, 2016), narcissism (Wales et al., 2013[105], Mathieu and St. Jean, 2013; Hmieleski and Lerner, 2016), and ADHD-like behavior (Wiklund et al., 2017; Verheul et al., 2015). Arguments for the causal mechanism linking personality disorders with the occupational choice of entrepreneurship vary: While these traits are generally regarded as dysfunctional, in the context of entrepreneurial venturing they might actually offer some

[103] Haynes et al. (2015) outline and discuss how greed and hubris negatively affect the human as well as social capital of entrepreneurial ventures and consequently also the financial performance and success of the start-up.

[104] The authors discuss the topic theoretically not empirically.

[105] The authors find a propensity of narcissistic CEOs to increase entrepreneurial orientation in the companies they work for.

benefits.[106] Individuals scoring high on dark personality traits have been shown to deal better with the uncertainties present in the entrepreneurial environment, as well as its challenges (Jonason et al., 2009; Jonason and Tost, 2010). Thereby higher levels of resilience play an important role (see Hayward et al., 2010). Individuals high on dark personality traits have further demonstrated biases towards risk taking, gambling, novelty seeking, creativity, the disruption of the status quo (Jones, 2003; Mathieu et al., 2013; Wiklund et al., 2017), and elevated levels of confidence (Mathieu and St. Jean, 2013). All characteristics which have been related to those of entrepreneurs (see e.g., Koellinger et al., 2007; Burmeister and Schade, 2007). In addition, entrepreneurship may allow these individuals to attain the level of power, independence, flexibility, and influence they, based on their personality profile, seek.

Looking at the traits of the dark triad more specifically, narcissistic individuals have demonstrated inflated, biased levels of confidence regarding not only their chances of success, but also in relation to the required capabilities and resources in order to effectively and successfully engage in venturing (Navis and Ozbek, 2016). Thereby, disregarding the associated risks (Campbell et al., 2004; Wales et al. 2013). Additionally, narcissists crave the admiration and respect of others, so starting up one's own venture might present an attractive vocation option for them, as founding an entrepreneurial venture is often regarded as highly appealing, due to the success stories presented in the media of, e.g., Zuckerberg, Musk, and Page, rather than the actual high failure rates prevailing in venturing (*representative bias*). Further, narcissists match certain other personality features that have been detected in past entrepreneurship research. These include higher levels of risk-taking propensity (Stewart and Roth, 2001; Foster et al., 2009a; Foster, et al., 2009b), overconfidence (Koellinger et al., 2007), self-efficacy and internal locus of control (Rauch and Frese, 2005; Chen et al., 1998; Mathieu and St. Jean, 2013), high extraversion, high openness to experience, and low agreeableness (Brandstätter, 2011; Paulhus and Williams, 2002). Mathieu and St-Jean (2013) find within their sample of student entrepreneurs and non-entrepreneurs (comprising non-entrepreneurial students, employees and managers) that entrepreneurial subjects showed

[106] Thereby, the benefits apply to the choice of becoming and staying an entrepreneur, but not necessarily in relation to the performance of the venture nor its sustainability in terms of both economics and environmental concerns.

significantly higher levels of narcissism. Moreover, the authors report a significant relationship between narcissism and entrepreneurial intentions. Akhtar et al. (2013) find entrepreneurial tendencies, as well as abilities, to be positively related to primary psychopathy. The authors also find primary psychopathy to be negatively related to social entrepreneurship (Akhtar et al., 2013).

While dark traits might increase the likelihood of becoming an entrepreneur due to the aforementioned reasons, the effects of these traits onto venturing performance are rather dire. Kets deVries (1985) was one of the first to empirically investigate how dark personality traits of entrepreneurs can have destructive effects on the success of entrepreneurial ventures, i.e., by being too detail oriented or by failing to collaborate. Stevens et al. (2012) empirically examine how successful psychopaths, using undergraduate students as subjects, respond to ethical dilemmas in different business settings.[107] Thereby, the subjects need to respond to four different scenarios, each depicting some sort of ethical dilemma in a business setting (i.e., foregoing quality or safety for profits). They find, mediated by moral disengagement[108], a significant positive relationship between unethical decision-making and successful psychopaths. The authors conclude that individuals, who despite their psychopathic tendencies, manage to live successful lives, are more prone to making unethical business choices than individuals without such declinations, while cognitively distancing themselves from these choices via moral disengagement (Stevens et al., 2012).

For this part of the study, I closely follow the approach by Hmieleski and Lerner (2016) and elicit the identical relevant variables. Replicating their study allows us to get an indication regarding the robustness and generalizability of the results, in particular across different cultures. I consequently formulate the following hypotheses in the same direction as done in their paper.

[107] Unethical decision making is conceptualized as "(…) an individual's willingness to engage in a moral- or norm-violating behavior, where there is no obvious correct or incorrect course of action often in response to an ambiguous situation." p. 142.

[108] Convincing oneself that ethical or moral standards do not apply to oneself in a certain situation (Bandura et al., 1996).

HYPOTHESIS 4: *I expect students' scores on (a) Machiavellianism, (b) psychopathy, and (c) narcissism to be positively related to entrepreneurial intentions.*

HYPOTHESIS 5: *Individuals' levels of (a) Machiavellianism, (b) psychopathy, and (c) narcissism will be negatively associated with their level of productive entrepreneurial motives.*

HYPOTHESIS 6: *Individuals' levels of (a) psychopathy, (b) Machiavellianism, and (c) narcissism will be positively associated with their level of unproductive entrepreneurial motives.*

The authors find a positive association between narcissism and entrepreneurial intentions, while both Machiavellianism and psychopathy are insignificant in this context. They additionally find all three traits to be positively related to unproductive entrepreneurial motives. Concerning productive entrepreneurial motives, their findings are rather mixed. The authors report a significant positive relationship for narcissism, a significant negative relationship for psychopathy, and no relationship in regards to the variable of Machiavellianism.

I next describe the experimental design and its individual measures before outlining the study's empirical analysis and the specific findings.

5.3. Data

5.3.1. Sample

The experiment was conducted at the laboratory of Humboldt Universität zu Berlin in Mai 2017. N=62 students from the field of business and economics were recruited via the online recruitment system ORSEE (Greiner, 2015). Half of the subjects were enrolled in economics, 35 percent in business studies, 10 percent studied a combination of economics and business, and about 5 percent majored in statistical methods. Experimental sessions lasted between 45-60 minutes. Average pay-outs amounted to 13.47 Euros. The subject's average age is M=23 ($S.D.$=2.59) years. A bit less than half of the subject pool is male (46.8 percent) and predominantly from Europe (93.5 percent). The experiment

was programmed with the experimental software z-Tree (Fischbacher, 2007). Confidentiality and anonymity were ensured by the experimental design as well as experimental procedures throughout the entire process.

5.3.2. Measures

The experiment consists of several different parts, eliciting a range of measures, which will be outlined next.

5.3.2.1. Elicitation of preferences

The research started with the elicitation of different preferences, all via an incentivized, revealed preference approach.

Risk preferences were elicited via the Holt and Laury lottery framework (Holt and Laury, 2002). In the framework, subjects have to decide for then different lottery pairs, which type of lottery they prefer to play. There are two different types, one presenting a riskier lottery (lottery B) than the other (lottery A). Generally, the individual's crossover point (switching from lottery A to lottery B) determines the individual's risk preference.[109]

In the second part of the experiment, subjects played a neutrally framed one-shot *dictator game*, as an elicitation measure of altruism/fairness. Students, in the role of the dictator (random allocation of roles by the computer), were endowed with 5 Euros. The dictator's task was to decide how much of the endowment she/he wanted to allocate to her/his counterparty, the receiver. Decisions were payout relevant. The receiver did not get any feedback as to how much the dictator allocated to her/him, in order to avoid any potential spillover effects of this information onto the next game, the public good game. Further, it was stressed that for each type of game, the counterparty would randomly be matched anew.[110]

[109] Risk will not be evaluated here. As outlined in Lauritzen et al. (2020), a considerable share of students demonstrated irrational behaviors during this task, such as multiple switching points (which is not unusual to happen in the Holt and Laury lotteries). Also, risk entered all relevant regressions insignificantly and was consequently dropped from the further analysis.

[110] As Lauritzen et al. (2020) use the same experimental design, very detailed information regarding the game set-up, instructions etc., can be obtained from that paper.

For the measure of cooperation, subjects had to play a 2-player-repeated public good game. Subjects were matched with a new counterparty, which stayed constant for all ten rounds of the game. A range of comprehension questions ensured subject's understanding of the game's payoff function:

$$\pi_i(g_1, g_2) = 5€ - \ own\ contribution\ to\ the\ project + 0.7\ (own\ contribution\ to\ the\ project + counterparty's\ contribution\ to\ the\ project)$$

After each round played, subjects obtained feedback regarding their counterparty's contribution, their own contribution, and the resulting payoff based on those contribution levels. Subjects did not know about the exact rounds to be played in order to avoid behaviors driven by strong iterated thinking (see Lauritzen et al. (2020) for a discussion on this aspect).

The public good game was then followed by another dictator game. The parameters were identical to the first dictator game, however this time all participants who were allocated the dictator role in the first dictator game, became the receiver in the second dictator game and vice versa. Figure 4 below summarizes the details for the elicitation of the social preferences.

Figure 4: Summary of experimental game structure

Dictator Game 1	**Public Good Game**	**Dictator Game 2**
• Endowment: 5 Euros • Random allocation of roles by computer • Randomly matched with a new counterparty • No feedback after game	• Endowment: 5 Euros • New random allocation of counterparty by computer • Counterparty constant for all 10 periods of play • Feedback after each round	• Endowment: 5 Euros • Opposite role as in DG1 • Random allocation of roles by computer • Randomly matched with a new counterparty • No feedback after game

Subjects' total pay-out was determined at the end of the experiment (after the questionnaire). Thereby, for the first part (Holt and Laury lottery) the computer randomly chose one of the ten lottery pairs relevant for pay-out. For the dictator game, subjects were paid out the money they decided to keep for themselves (when allocated the role as dictator) and the money they (potentially) received when in the role of the receiver.

Finally, one out of the ten rounds of the cooperation game was randomly selected by the computer for pay-out.

5.3.2.2. Control variables and entrepreneurial intentions

In order to rule out alternative explanations in relation to our hypotheses, the experiment proceeded with a questionnaire, collecting additional (control) variables. First, subjects had to answer general demographic questions (i.e., field of study, gender, age, country of birth). I control for gender, as past research has shown women to generally exhibit stronger social preferences and lower scores on the dark triad (Eckel and Grossman, 1996; Jonason and Webster, 2010). The relationship between gender and entrepreneurial intentions is less clear (Díaz-García and Jiménez-Moreno, 2010). Finally, I also control for life satisfaction, as past research has linked social preferences (in particular in relation to distributional social preferences) to happiness measures (Charness and Grosskopf, 2001; Delhey and Dragolov, 2014; Oishi et al., 2011; Ferrer-i-Carbonell and Ramos, 2014). Next, entrepreneurial intentions were elicited (Chen et al., 1998). Their scale consists of five items, higher scores represent higher levels of entrepreneurial intentions. Internal consistency was high, with Cronbach's coefficient alpha (α) of 0.96. Then the dark triad and (un)productive entrepreneurial motives questionnaires were presented; both will be outlined in detail below. Thereafter, subjects had to answer questions in regards to *trust* and the *world values survey* (WVS), the former measure was taken directly from the German socio-economic panel (SOEP) questionnaire. Finally, entrepreneurial self-efficacy (based on Weitzel et al., 2010) was elicited[111].

5.3.2.3. The dark triad – the dirty dozen

For the elicitation of the dark triad, students had to answer the *dirty dozen* (Paulhus and Williams, 2002) questionnaire. The survey consists of twelve questions in total, four items for each trait. The measure was developed with reference to the NPI (Raskin and Hall, 1979) in case of narcissism, the SRP-III (Williams et al. 2003) in relation to psychopathy, and finally the Mach-IV (Christie and Geis, 1970) in relation to Machiavellianism. Subjects have to answer on a 9-point Likert scale how much they (dis)agree with the given statements (1= strongly disagree; 9= strongly agree). Examples for statements include: *"I tend to manipulate others to get my way"* (Machiavellianism).

[111] Note, the trust, WVS, and entrepreneurial self-efficacy measure will not be further evaluated in this paper.

"I tend to seek prestige or status" (narcissism). *"I tend to lack remorse"* (psychopathy). The measures' internal consistency was high to acceptable, with Cronbach's coefficient alpha (α) of 0.89 for narcissism, 0.68 for psychopathy and 0.73 for Machiavellianism.

5.3.2.4. Productive and unproductive entrepreneurial motives

Finally, subjects had to answer questions regarding their *personal* motivation to pursue both productive and unproductive entrepreneurial motives. This questionnaire was developed by Hmieleski and Lerner (2016), and is primarily based on Baumol's (1990) theoretical considerations of productive and unproductive entrepreneurship. For each motive, subjects have to answer five items on a five-point Likert response scale (1= strongly disagree; 5= strongly agree). The question was stated in the following way *"If I were to start a new venture, my motivation for the business would include wanting it to…"*. Example item for unproductive entrepreneurial motive: "*Achieve financial success, even if it is a little destructive to society*." Example item productive entrepreneurial motive*: "Develop a culture in which its employees value their work."* Items were averaged, higher scores represent stronger motives, both for the variable of productive and unproductive entrepreneurial motives. The measure showed reasonable internal consistency, with Cronbach's coefficient alpha (α) of 0.77 and 0.66 for unproductive and productive motives respectively.

I will make use of this variable in two ways: First, I will examine - in the same manner as Hmieleski and Lerner (2016) - how (un)productive entrepreneurial motives are related to the dark triad and discuss the implications. Further, I will evaluate if and how the social preferences measured in our experimental design are related to productive and unproductive entrepreneurial motives. Investigating this relationship should give us better insights as to how to interpret the findings, from *both* of these measures, i.e., can productive entrepreneurial motives be interpreted with altruistic concepts? And vice versa, can we get an indication as to what altruistic or cooperative preferences exactly measure in an *entrepreneurial motive* concept. To give a specific example, is the productive entrepreneurial motive *"to generate value for society"* (item 8) linked to altruistic concepts as measured in the classic dictator game? Or are cooperative tendencies, as measured in the public good game, negatively related to unproductive motives such as wanting to *"maximize profits, even at the cost of employees' well-being?"* (item 2)?

5.4. Empirical Analysis

Mainly, I use correlation and regression analysis to evaluate the outlined hypotheses. Hypotheses were analyzed with control variables (full model) and without (main effects model). When the addition of the control variables to the main effects model induced no change in the statistical significance of findings, I exclusively report the full model. All measures were standardized ($\mu=0$; $\sigma=1$).[112] In the analysis investigating the relationship between the dark triad and (un)productive entrepreneurial motives, I follow Hmieleski's and Lerner's (2016) approach and select exclusively subjects with high entrepreneurial intentions.[113] While I additionally report the findings in relation to the entire sample, it is certainly in particular relevant to look at the entrepreneurial motives of those who self-report intentions to start-up a venture.

[112] Except in the Tobit regressions, where non-standardized variables were applied.

[113] Thereby, applying a median-split procedure for classification purposes.

Table 27 presents the variables' respective means, standard deviations, the possible range for each construct based on the experimental design, its min-max range, and internal reliabilities, measured via Cronbach's alpha, where applicable. Correlations, calculated between scores of the dark triad, entrepreneurial motives, social preferences, and the control variables are reported in Table 28.

Table 27: Descriptive statistics

	Variable	N	Mean	S.D.	Range	Min	Max	α
Social Preferences:								
1	*Altruism*: Amount allocated to receiver	62	1,04	1,14	⟨0 - 5⟩	0	4,90	-
2	*Cooperation:* Amount allocated to project	62	2,71	1,84	⟨0 - 5⟩	0	5	-
Dark Triad:								
3	Psychopathy	62	3,13	1,33	⟨1 - 9⟩	1	6,25	0,68
4	Narcissism	62	4,68	1,90	⟨1 - 9⟩	1	8	0,89
5	Machiavellianism	62	3,27	1,51	⟨1 - 9⟩	1	6,5	0,73
6	Dirty Dozen	62	3,69	1,12	⟨1 - 9⟩	1,16	6	0,79
Entrepreneurial Motives:								
7	unproductive motives	62	2,24	0,81	⟨1 - 5⟩	1	4,8	0,77
8	productive motives	62	4,08	0,61	⟨1 - 5⟩	2,2	5	0,66
Control variables:								
9	Male	62	0,47	0,50	⟨0;1⟩	0	1	-
10	Entrepreneurial Intentions	62	2,40	1,03	⟨1-5⟩	1	4,80	0,96
11	Satisfied with Life	62	7,87	1,48	⟨1-11⟩	2	10	-

While not a main hypothesis, independent sample *t*-tests report significant gender differences on the scale of psychopathy ($t(60)=-3.21$; $p=0.002$), and altruism ($t(60)=2.5715$; $p=0.013$). Males score higher on psychopathy and allocate less money in the dictator game, in line with past findings (e.g., Eckel and Grossman, 1998). Overall, there is no significant gender difference (two-sided) on the dirty dozen scale ($t(60)=-1.4684$, $p=0.1472$), this is also observable from the correlations output in Table 28.

Worth mentioning are some findings in regards to happiness. While no significant relationship between self-reported happiness and social preferences is observed (see e.g., Charness and Grosskopf, 2001), I find a significant negative relationship between self-reported happiness and the dirty dozen measure ($\rho=0.30$; $p<0.01$). Hence, lower levels of life satisfaction correlate with higher values on the dark triad. Research analyzing the relationship of happiness and the dark triad has produced rather ambiguous results (see e.g., Jonason and Tome, 2019).

Table 28: Intercorrelations of variables

Variable	1	2	3	4	5	6	7	8	9	10	11
Social Preferences:											
1 Altruism	1,00										
2 Cooperation	0,17	1,00									
Dark Triad:											
3 Psychopathy	-0,11	-0,20	1,00								
4 Narcissism	0,08	0,05	0,10	1,00							
5 Machiavellianism	-0,01	-0,30**	0,47***	0,23*	1,00						
6 Dirty Dozen	-0,01	-0,18	0,66***	0,71***	0.76***	1,00					
Entrepreneurial Motives:											
7 unproductive motives	-0,12	-0,07	0,38***	0,54***	0,28**	0,58***	1,00				
8 productive motives	0,001	0,11	-0,07	0,004	0,17	0,07	-0,14	1,00			
Control variables:											
9 Male	-0,33***	-0,04	0,38***	0,04	0,03	0.19	0,06	-0,04	1,00		
10 Entrepreneurial Intentions	0,02	-0,04	-0,22*	0,05	0,06	0.03	-0,16	0,00	0,10	1,00	
11 Satisfied with Life	-0,20	0,06	-0,19	-0,23*	-0,216*	-0,30***	-0,14	0,02	0,06	0,20	1,00

5.4.1. Findings in relation to altruism (Hypothesis 1)

Starting the analysis for the variable of *altruism*, I find only the correlation of gender (as discussed above) to be significant (p=0.01) and, applying the guidelines by Cohen (1988) for the interpretation of correlation coefficients, of medium strength (ρ=-0.33). None of the other control variables, and more importantly, the traits of the dark triad, or the dirty dozen overall, show strong or significant correlations.

The same results can be obtained from the Tobit regressions presented in Table 29, for the column 'altruism'. Thereby, the dependent variable is the amount the dictator transferred to the receiver. I find none of the main effect variables (the dark triad) to be significantly related to the dependent variable of altruism. Only for the variable of gender do I observe significant findings: Males allocate significantly (p<0.01) less money to the receiver in the dictator game.[114]

Consequently, the results do *not support hypotheses 1.a, 1.b, and 1.c*, which predicted (a) Machiavellianism, (b) psychopathy, and (c) narcissism to be negatively associated with the preference of altruism.

5.4.2. Findings in relation to initial cooperation (Hypothesis 2)

Next, I look at the second hypothesis, which made its predictions in relation to *initial cooperation*[115] and the *dark triad*. Here, a significant (p=0.02) negative correlation (ρ=-0.3) between Machiavellianism and the amount allocated to the project in the first round is found (see Table 28).

Again, the same finding can be obtained from the Tobit regression model in Table 29. For the column of cooperation, I find a significant negative coefficient for the variable of Machiavellianism (β=-0.63, p<0.05), consequently finding support for *hypothesis 2.a*,

[114] Note, also when controlling for game order in the regression (as was done in Lauritzen et al. (2002)) results remain unchanged.

[115] Measured via the first-round play of the public good game.

which predicted a negative association between the trait of Machiavellianism and the initial willingness to cooperate in the public good game.

Table 29: Tobit regression models for social preferences

Dependent variable: Allocations (as % of endowment)		
	Altruism	Cooperation
Variable	Full Model	Full Model
Control variables		
Male	-1.268**	-0.0309
	(0.501)	(0.872)
Age	0.0995	0.0167
	(0.0883)	(0.160)
Happiness	-0.240	-0.0243
	(0.153)	(0.281)
Main effects		
Psychopathy	-0.00216	-0.199
	(0.206)	(0.373)
Machiavellianism	-0.0285	-0.632**
	(0.169)	(0.312)
Narcissism	0.0541	0.223
	(0.122)	(0.223)
Constant	0.551	4.374
	(2.517)	(4.582)
Sigma	1.604	2.907
	(0.210)	(0.404)
Number of individuals	62	62
Log Likelihood	-88.37	-111.06
LR $\chi 2$	10.68	7.21
(Prob.>$\chi 2$)	0.099	0.206
Obs. Censored at zero	27	11
Obs. Censored at five	0	17

Standard errors in parentheses
*p<0.1; p**<0.05;***p<0.01;

Looking at the other two traits of the *dark triad*, I find *no support for psychopathy (hypothesis 2.b) (β=-0.2, p>0.1)* and *narcissism (hypothesis 2.c)* (β=0.22, p>0.1) to be significantly associated with cooperative tendencies.

5.4.3. Findings in relation to cooperation over time (Hypothesis 3)

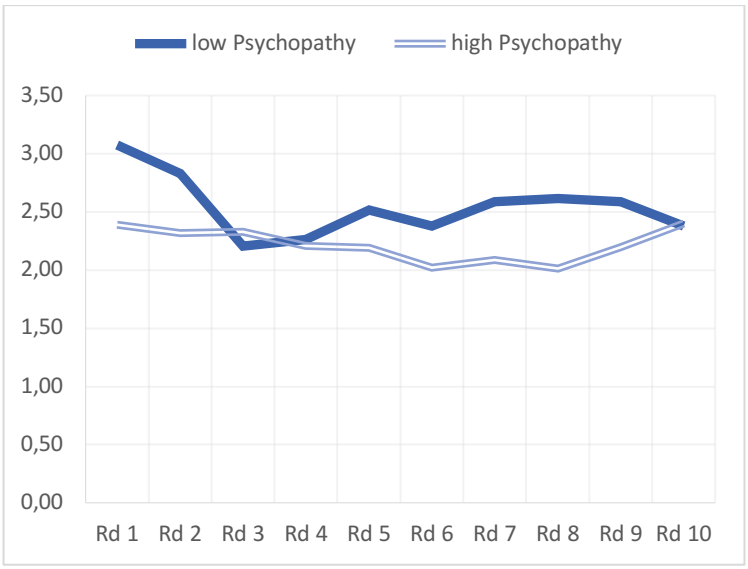
I next look at the association of the dark triad and cooperative behavior across the 10 rounds of the public good game.

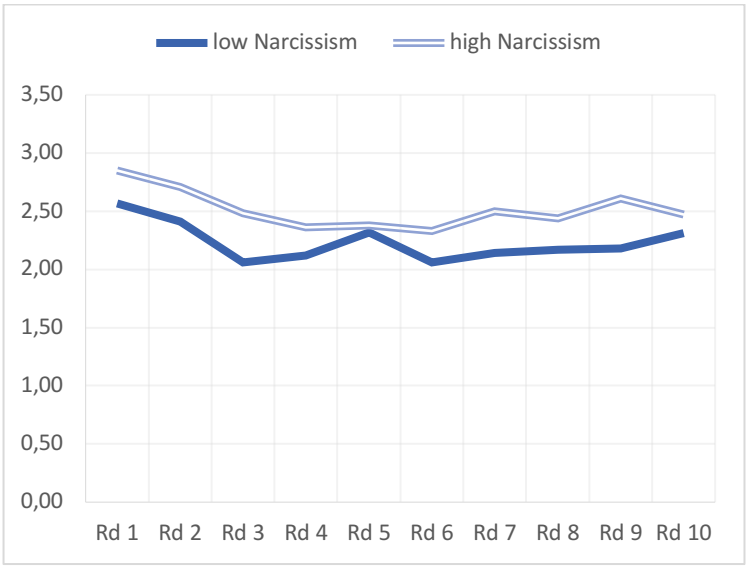
While our third hypothesis was specifically in relation to the trait of Machiavellianism and its connection to cooperative behavior in later rounds (over time) of the public good game, due to the trait's prominence of strategic and reciprocal considerations, for completeness I also briefly discuss the other traits of the dark triad in this context. Graph 6 summarizes for each trait the allocation levels in Euro amounts (vertical axis) to the project per round (horizontal axis). The subject pool is thereby split by individuals scoring high vs. low on the respective trait, using a median split procedure. While consistently higher average contribution levels to the project across all rounds are observed for the high MACH sub-sample, the picture is less consistent for psychopathy and narcissism. Using Wilcoxon Rank Sum tests, for average contribution levels across all rounds, as well as for each individual round, I find exclusively for initial cooperation choices (round 1.) in regards to Machiavellianism significantly different behaviors (z=1.946; p=0.05) between high MACHs (M=3.18; $S.D.$=0.336) and low MACHs (M=2.27; $S.D.$=0.313). This was discussed in the previous section. No significant differences are found for any of the later rounds.

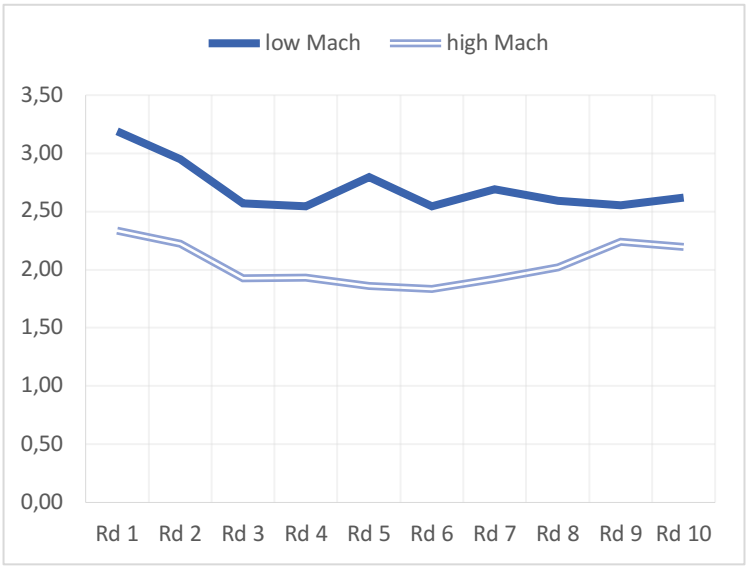
Consequently, there is no support for hypothesis 3, which predicted that the willingness to cooperate in later rounds of the public good game would be significantly lower among high MACH individuals.

This completes the analysis of investigating the relationship between social preferences and the dark triad. I proceed by analyzing the data in relation to dark personality traits in an entrepreneurship context.

Graph 6: Allocation to the public good by period and personality trait







5.4.4. Entrepreneurial intent and the dark triad (Hypothesis 4)

In this section I analyze the variables in relation to hypothesis 4, which predicted positive associations between entrepreneurial intentions and the traits of Machiavellianism *(hypothesis 4.a)*, psychopathy *(hypothesis 4.b)*, and narcissism *(hypothesis 4.c)*.

As can be seen from the regression output in Table 30, contrary to the predictions of *hypothesis 4.b*, a significant *negative* relationship between subjects who self-report intentions to start their own business and the trait of psychopathy (for the full model: β=-0.404; p=0.012) can be observed. In relation to the trait of Machiavellianism, a positive relationship (for the full model β=0.26; p=0.07), which is marginally significant when control variables are added to the model, is obtained - hence finding marginal support for *hypothesis 4.a*. No evidence for a link between narcissism and entrepreneurial intentions (for the full model, β=0.04; p=0.735) is found in the data.

Table 30: OLS regression analysis - Hypotheses 4 a, b, c

Dependent variable: Entrepreneurial intentions		
Variable	Main Effects	Full Model
Control variables		
Male	-	0.247* (0.136)
Age	-	-0.108 (0.126)
Happiness	-	0.184 (0.130)
Main effects		
Psychopathy	-0.324** (0.142)	-0.404** (0.155)
Machiavellianism	0.204 (0.145)	0.266* (0.144)
Narcissism	0.0337 (0.129)	0.0441 (0.129)
Observations	62	62
F-Ratio	1.83	2.02
R squared	0.09	0.18

Standard errors in parentheses.
*p<0.1;**p<0.05;***p<0.01;

Table 31 below summarizes, split by high and low entrepreneurial intentions (EI) (median split), mean scores for each dark triad trait and the dirty dozen in general.

Table 31: EI and the dark triad: Mean values (standard deviations in parentheses)

Variables	N	Psychopathy	Narcissism	Machiavellianism	Dirty Dozen
High entrepreneurial intentions	32	2,70 (0,213)	4,80 (0,338)	3,34 (0,281)	3,615 (0,198)
Low entrepreneurial intentions	30	3,58 (0,241)	4,55 (0,349)	3,19 (0,264)	3,775 (0,21)

5.4.5. (Un)productive entrepreneurial motives (Hypotheses 5 & 6)

In a next step, I analyze the data in relation to *productive* and *unproductive entrepreneurial motives*. As previously described, in order to better relate the findings to those of Hmieleski and Lerner (2016), I run the analysis with the sub-sample of students intending to start a business (N=32). Here, the focus is on (i.) how these types of

entrepreneurial motives are related to the traits of the *dark triad* (*hypotheses 5* and *6*) and (ii.) how they are associated with the other-regarding preferences of altruism and cooperation.

Table 32 summarizes the OLS regression output for both *productive and unproductive entrepreneurial motives* as dependent variables. As can be seen from the output column for productive entrepreneurial motives, no effect of the *dark triad* onto the dependent variable of *productive* entrepreneurial motives is observed, finding no support for *hypothesis 5*.

Moving to *unproductive* entrepreneurial motives, a highly significant positive association for the trait of narcissism (β=0.511; p=0.003) and a marginally significant relationship for the trait of psychopathy (β=0.429; p=0.06) is found. No effect is found for the trait of Machiavellianism. I consequently find full support for hypothesis for *hypothesis 6.c*, marginal support for *hypothesis 6.b*, and no support for *hypothesis 6.a.*

Table 32: OLS regression model (un)productive entrepreneurial motives

	Productive entrepreneurial motives	Unproductive entrepreneurial motives
Variable	Full Model	Full Model
Control variables		
Male	-0.035	-0.150
	(0.245)	(0.201)
Age	0.308	0.0409
	(0.181)	(0.148)
Happiness	-0.232	0.150
	(0.192)	(0.157)
Main effects		
Psychopathy	-0.126	0.429*
	(0.268)	(0.220)
Machiavellianism	-0.004	0.0405
	(0.211)	(0.173)
Narcissism	0.248	0.511***
	(0.187)	(0.154)
Observations	32	32
F-Ratio	1.11	3.68
R squared	0.21	0.4687

Standard errors in parentheses.
*p<0.1; **p<0.05; ***p<0.01;

I argue that it is also relevant to investigate the relationship between *(un)productive entrepreneurial motives* for our entire sample of business and economics students. While some of these subjects might not intend to start an entrepreneurial venture upon the completion of their studies, most of them are likely to be involved in running a business, if not as an entrepreneur, then maybe as a manager or else, perhaps at an executive level, most likely at some team level. Maybe even in a start-up for which these motives are particularly relevant. Therefore, the above regression model is repeated for the entire sample (the results can be obtained from Table XXI in Appendix 6.4.). While there is no change in relation to productive entrepreneurial motives (all dark traits remain insignificant), a highly significant positive link between both narcissism (β=0.519, p=0.000) and psychopathy (β=0.382, p=0.005) in relation to unproductive entrepreneurial motives is obtained. Machiavellianism remains insignificant (β=0.002, p=0.986).

Finally, I look at the relationship between (un)productive entrepreneurial motives and the social preferences of altruism and cooperation as captured by the data.[116] As can be seen from Table 33, neither for the coefficient of altruism nor cooperation does the data report a significant relationship with productive and unproductive entrepreneurial motives.

Table 33: OLS regression model (un)productive entrepreneurial motives and social preferences

	Productive entrepreneurial motives	**Unproductive entrepreneurial motives**
Variable	Full Model	Full Model
Control variables		
Male	-0.0814	0.0572
	(0.144)	(0.142)
Age	0.166	-0.0886
	(0.138)	(0.136)
Happiness	-0.0203	-0.115
	(0.141)	(0.139)
Entrepreneurial intentions	0.0364	-0.153
	(0.138)	(0.136)
Main effects		
Altruism	-0.0640	-0.104
	(0.149)	(0.146)
Cooperation	0.111	-0.0491
	(0.135)	(0.133)
Observations	62	62
F-Ratio	0.37	0.67
R squared	0.0388	0.068

Standard errors in parentheses.
*p<0.1;**p <0.05;***p<0.01;

In an additional step, I investigate whether the *individual items* of the entrepreneurial motives scale (Hmieleski and Lerner, 2016) are related to the social preferences of altruism and cooperation. Therefore, I run correlation analysis between each item of the entrepreneurial motives scale with respect to altruism and cooperation respectively. No significance is found on any item.

[116]The independent variable of altruism is measured via the dictator's allocations to the receiver; the exogenous variable reflecting cooperative tendencies is measured by the allocations to the public good in the first round.

5.5. Discussion, Limitations, Future Research

5.5.1. The dark triad and social preferences

5.5.1.1. The dark triad and altruism

Starting the discussion of the findings in relation to the dark triad and social preferences, I find no significant relationship between Machiavellianism, psychopathy, and narcissism to the social preference of altruism (*hypothesis 1 a*, *b*, and *c*). As outlined in section 5.2.2, the only other study I am aware of, which investigates the dark triad and game behavior is by Berg et al. (2013). The authors found a significant negative relationship between all three traits and the amount the dictator allocated to the receiver. However, one needs to keep in mind, that both the receiver and the payout in their experimental design were hypothetical. Real incentives present one of the key elements of *induced value theory* and hence economic experiments, according to Vernon Smith (1976).[117] As discussed in section 5.2, in particular in relation to *social desirability*, not providing real monetary incentives could have an idiosyncratic impact on findings. Social desirability bias in this case might influence both, the rating of the dark triad (i.e., by wanting to appear "nice" in terms of your personality structure, and hence scoring insincerely low on the dark triad questionnaire), as well as the behavior in the dictator game (i.e., by donating considerably high (but hypothetical!) amounts to the receiver in the dictator game). Dark traits might potentially even be a predictor for social desirability. The just described mechanism might drive the findings by Berg et al. (2013). In our experimental design, the desire to appear generous or altruistic is costly, as subjects actually "lose" the money they allocate to the receiver. Dark traits in an incentive compatible setting (measuring real behavior) appear to be a less good predictor.

In this context, I also controlled whether the knowledge of game theory (i.e., by having taken a game theory or decision-making class) plays a role – as maybe personality plays less of a role in situations where one mathematically or theoretically understands

[117] See also Camerer and Hogarth (1999) for an interesting discussion of financial incentives in experiments.

the "optimal choice" outcome, or the theoretical interpretation thereof. Regression results show no significant relationship in this regard[118].

5.5.1.2. The dark triad and cooperation

I next analyzed the dark triad in relation to cooperative tendencies and found a significant negative relationship between the trait of Machiavellianism and the initial willingness to cooperate in the public good game. This is in line with the findings by Berg et al. (2013). It appears that the strategic, rational cool attitude of high MACHs, in combination with their exploitative nature (e.g., Vecchio and Sussmann, 1991), and their disregard for social norms or pressures, do manifest in this context. However, as players in this game move simultaneously, I cannot be sure whether this effect is purely driven by selfish reasons, or whether higher levels of distrust in relation to the counterparty's behavior also play a role in this context. No relationship was found between initial cooperation levels (as well as for cooperation levels in later rounds of the game) for the traits of narcissism and psychopathy.

Also, no significantly different behaviors were found for high and low MACHs throughout the public good game (*hypothesis 3*). For this part of the discussion, it is important to remember that in the experimental design subjects did *not* know the exact number of rounds to be played in the public good game (see section 5.4.2.1.).[119] As a consequence, it is considerably more difficult to establish a rational, game theoretic strategy. As high MACHS tend to be strongly driven by strategic considerations (i.e., to form the most advantageous strategy in terms of own payoffs), this design feature could potentially also be the reason why no significantly different behaviors were observed across high and low MACHS over time. While low MACHS allocate more money to the project across all rounds, statistical significance was found exclusively for the first round. It would be interesting to examine in future research, if and how behavior changes when the exact number of rounds to be played is known to subjects. Additionally, sample size might play a factor in this context. With regards to psychopathy and narcissism, it is hard

[118] In the demographic questionnaire, students were asked whether they had previously taken a game theory class. I then replicated the Tobit regression from Table 29 while additionally controlling for "game theory experience". The coefficient is insignificant and findings remain unchanged.

[119] In order to make the scenario more realistic from an entrepreneurial context perspective.

to determine whether this design feature played a role for the obtained results, even more so as these traits were insignificant for initial cooperation levels.

Finishing the discussion in regards to dark traits and social preferences, I look at the argument by Smillie and Zhao (2015) regarding *strong* and *weak situations* (see also Brandts and Charness, 2000). The authors argue that in weak situations, such as the dictator game relative to the public good game, the role of personality is elevated (Smillie and Zhao, 2015). The data does not support this proposal in relation to the dark triad. The relationship appears to be more complex, maybe some personality traits play more of a role in certain contexts than in others. Machiavellianism for example, also based on its definition, seems to be in particular relevant in strategic contexts (i.e., to create a strategic advantage for oneself). Since there is no strategic component present in the dictator game, it is hence reasonable to expect a stronger association between Machiavellianism and the public good game, relative to the dictator game. I encourage future research to create experimental designs which analyze the relationship between dark traits and different economic games, in order to gain a better understanding. For example, as to how the relationship between a certain personality traits and various games hold up and whether systematic differences across games and personality traits might eventuate.

5.5.2. The dark triad and entrepreneurial intentions

Next, I discuss the findings in relation to *entrepreneurial intentions* and the *dark triad (hypothesis 4)*. No systematic differences between students with high and low entrepreneurial intentions were found for the trait of narcissism. I hence cannot confirm the results by Mathieu and St-Jean (2013) and by Hmieleski and Lerner (2016), both reporting a significant positive association between narcissism and entrepreneurial intentions.

Contrary to our predictions and the findings by Hmieleski and Lerner (2016), a significant negative association between entrepreneurial intentions and psychopathy was found. Economics and business students who do not report the intention to start up their own venture display higher levels of sub-clinical psychopathy. For the variables of Machiavellianism and entrepreneurial intentions a marginally significant positive association was found.

What are the implications of these findings? First of all, in relation to narcissism and in particular in relation to psychopathy, I deem these findings good news. The results suggest potential entrepreneurs to be less likely to hold psychopathic tendencies and to be no more, but also no less, inclined to hold narcissistic tendencies than other individuals. This is relevant, in particular for the direct stakeholders of the entrepreneurial firm, such as its employees, suppliers, and venture capitalists (or other credit providers), as they do not have to manage these personalities in order to secure their own (financial) well-being. For the case of narcissism, it has been well documented how wide ranging and serious the adverse effects of narcissistic leaders or managers are for organizations (Braun et al., 2016; Campbell et al., 2011; Rosenthal and Pittinsky, 2006; Chatterjee and Hambrick, 2011), widely driven by the effect their negative behavior has on fellow workers and subordinates. Similarly, for the case of psychopathy, which has been related to aggression, counterproductive behaviors, and unethical organizational decision-making (see Smith and Lilienfeld, 2013). Hence, the finding implies decreased chances of having to manage entrepreneurs' manipulative, impulsive and risk seeking aspect of psychopathy, reducing the need for e.g., extensive due diligence or long-term monitoring activities. Surely, also society at large is impacted by this finding – I discuss this aspect in more detail when reviewing the findings regarding the link between dark traits and *(un)productive entrepreneurial motives* – as these entrepreneurial motives are particularly related to societal outcomes.

With regards to Machiavellianism, I find students with higher entrepreneurial intentions to score marginally higher on this trait. This finding could be driven by the aspect of high MACHs to follow their purpose and pursue their interests (O'Boyle, 2012). Hmieleski and Lerner (2016) did not find a significant relationship in this aspect. What are the implications here? In relation to Machiavellianism and job performance findings are diverse. On the one hand, scholars suggest a positive relationship in this context, based on the ability of high MACHs to secure their own interests, and by succeeding in social interactions (e.g., O'Boyle et al., 2012). They also have been shown to do well in networking situations and demonstrate a strong ability to effectively influence others, e.g., by changing their perception (Jonason and Webster, 2012; Kessler et al., 2010). I argue that this could in particular in the context of entrepreneurship play a crucial role. Based on the innovative character within entrepreneurship, the ability to, e.g., persuade

capital providers but also customers and other stakeholders could present a distinguishable asset. Of course, there are also negative aspects in this regard, such as the inability to establish long-term relationships based on the egoistic tendencies of these individuals (this was discussed in section 5.2.1.3). There clearly are implications in relation to the expression of this trait. Zettler and Solga (2013) discuss the possibility of an inverted, U-shaped relationship between Machiavellianism and job performance.[120] Hence, it would be interesting to examine in future research whether this slightly higher level of Machiavellianism observed in individuals with entrepreneurial intentions is rather beneficial or detrimental for job performance (or both, depending on the context).

Our findings in this context are different to those of Hmieleski and Lerner (2016). One potential reason for this could be that of culture. While the majority of subjects in this study stem from Europe, Hmieleski and Lerner's (2016) sample consists of business school students in the United States. The influence of culture in this context is very complex, and to cover it fully goes beyond the scope of this paper. However, there could be systematic differences in the US and European culture, which make individuals with a dark triad profile to be more suitable for an entrepreneurial environment in the USA than in Germany. Our findings (and those of Hmieleski and Lerner, 2016 as well), suggest an influence of the dark triad onto entrepreneurial motives (see also next section). Motivations to found a business differ between the US and Germany: The GEM report of 2019/2020 collected data as to why individuals are motivated to found a business, and we see some clear differences in this context in relation to Germany and the USA. For example, while in the United States of America about 70 percent of entrepreneurs (strongly) agree with the statement *"Motivation to build great wealth or very high income"* in Germany this rate amounts to about 30 percent (Bosma et al., 2020). It could hence well be that due to the different entrepreneurial motives in these countries also the personality structure of entrepreneurs could be different.

[120] The authors find that some Machiavellianism leads to better job performance than low Machiavellianism. However, both levels perform significantly better than high levels of Machiavellianism (Zettler and Solga, 2013).

5.5.3. Dark traits and productive and unproductive entrepreneurial motives

Next, I discuss the findings in relation to the connection between *productive* and *unproductive entrepreneurial motives* and the traits of the *dark triad*.

5.5.3.1. The dark triad and productive entrepreneurial motives

No significant relationships between the *dark triad* and *productive entrepreneurial motives* is found. For comparison, Hmieleski and Lerner (2016) report also rather mixed results in this context. The authors report a significant *positive* relationship for narcissism, a significant *negative* relationship for psychopathy, and no relationship in regards to the variable of Machiavellianism.

5.5.3.2. The dark triad and unproductive entrepreneurial motives

The data shows a significantly *positive* relationship between both narcissism and psychopathy[121] and unproductive entrepreneurial motives. No systematic connection is found for the trait of Machiavellianism. Relating these findings to those of Hmieleski and Lerner (2016), the authors found a significant positive relationship for both Machiavellianism and psychopathy, while narcissism was significant in only one of their two samples. The findings imply that the conclusions from the field of organizational behavior, which report negative effects of these dark traits onto a range of firm performance measures (Forsyth et al., 2012) can, in case of narcissism and psychopathy, also be observed for an entrepreneurial context. There appears to be a systematic relationship between the *dark triad* and the motivation to pursue *unproductive entrepreneurial motives*. This is an important finding as it suggests, that studying the personality traits of entrepreneurs - in particular dark traits - can provide us with valuable information regarding their potential motivations to operate their business. Dark traits appear to be a driver for unethical and environmentally unfriendly decision-making. Given the increasing environmental degradation on our planet, our society is in desperate need for a generation of entrepreneurs who are not only aware of the severe environmental issues, but who are committed to bring about change to the system, even at the cost of lower profits. Entrepreneurs who are willing to operate their ventures with sustainable decision-making, or who create innovations which offer solutions to problems, such as

[121] Marginally significant when looking at the sample of potential future entrepreneurs (N=32), highly significant for the sample of business and economics students (N=62).

greenhouse gas emissions, chemical use, and pollution in general. Given the findings, it is unlikely that entrepreneurs, who are more strongly characterized by the dark triad, are the ones who are willing to make these much-needed balanced choices, as they appear to be rather unwilling to make trade-offs that would reduce their own monetary benefit. These entrepreneurs might not even be aware of the potential problems their venture is creating for their community, as i.e., narcissistic individuals are characterized by a strong self-focus (Emmons 1987). Hence, in order to incentivize individuals, who are willing to make these trade-offs, into entrepreneurship, an understanding of personality structure can certainly be helpful.

Now, combining these findings with those in relation to *entrepreneurial intentions* and the *dark triad,* there is some more good news: While exclusively for the trait of *Machiavellianism* a significantly positive connection to *entrepreneurial intentions* was observed, no link between *Machiavellianism* and *unproductive entrepreneurial motives* was found. This means that I do not find individuals with higher entrepreneurial intentions to be characterized by personality traits, which can be systematically linked to *unproductive entrepreneurial motives*. Rather on the contrary, for the trait of psychopathy, which is associated with a higher propensity to engage in unproductive entrepreneurial activities, I find a *lower* disposition in individuals with high entrepreneurial intentions. This means, ceteris paribus, for the likelihood of making social and sustainable decisions, I find better conditions in terms of personality structure within individuals who display high entrepreneurial intentions.[122]

Finally, I discuss the rather surprising result concerning the missing link between *(un)productive entrepreneurial motives* and the *social preferences* of altruism and cooperation.

5.5.4. Unproductive entrepreneurial motives and social preferences

Understanding the reason for this seemingly divergent finding is important, not only in order to gain a better understanding for the findings of this paper, but also for the

[122] However, for obvious reasons it is also highly desirable to have business and economics students to make the right trade-off choices, as they will be the managers, team leaders, decision makers in medium to large corporations, whose ecological footprint is just as important (see Markman et al., 2016).

interpretation of papers studying i.e., altruistic preferences in an entrepreneurial context (e.g., Weitzel et al., 2010; Lauritzen et al., 2020) or research investigating sustainable or social entrepreneurial decision-making (e.g., Engel et al., 2019; Shepherd et al., 2013; Markman et al., 2016).

In order to better understand this finding, I start by comparing our data to past research. To be more precise, I thereby want to establish how our sample scored (on average) on the measures of altruism and entrepreneurial motives in relation to past research. Do we observe rather low scores on altruism and high scores on productive entrepreneurial motives or vice versa? The interpretation depends on this. The scenario of subjects scoring low on productive entrepreneurial motives but allocating a large share of their endowment to the receiver in the dictator game leads to very different interpretations of the results than if subjects score high on productive entrepreneurial motives, but decide to allocate little or nothing to the receiver. Comparing the average contribution levels in the dictator game (M=20.74 percent) to those of Engel's (2011) meta-study, where subjects allocated, depending on various factors, such as culture, between 27 to 38 percent, I find our subjects to rather allocate on average less than in other samples. At the same time, the results on the scale of productive and unproductive entrepreneurial motives are very similar to those by Hmieleski and Lerner (2016). Consequently, it appears that the finding is driven by rather low levels of altruism. Displaying low social preferences in an incentivized preference revealing context, while at the same time self-reporting strong motives in terms of productive entrepreneurial behavior could be interpreted as "cheap talk". The potential problem of *social desirability bias* has already been discussed in some detail in section 5.5.1.1., but is certainly also relevant for this context. While the realization of this bias is costly for subjects in the incentivized games section of my experiment, it is payout independent in case of the self-reported data, such as the entrepreneurial motives. This might be a relevant driver for finding no relationship between the measured social preferences and (un)productive entrepreneurial motives. Future research would need to establish whether we observe this missing link between altruistic and cooperative preferences and (un)productive entrepreneurial motives also for different subject pools. However, then it is of course debatable, how relevant entrepreneurial motives are for subjects not studying business and economics.

Also, interesting for the interpretation of this context is the stream of literature investigating the gap between stated and revealed preferences (i.e., Frey et al., 2017).

While this study offers a range of contributions, it has its limitations, which I outline next.

5.6. Limitations

Concerning the analysis of personality traits and social preferences, I would like to raise the potential of *reverse causality*. I regressed economic preferences as a dependent variable on personality traits, presuming that these explain preferences. However, while this approach is very frequently observed in the literature (see section 5.2.2), exactly how these two constructs are linked is still unclear and certainly more research is needed to further identify a consistent relationship (see also Almlund et al. (2011) and Daly et al. (2009) for a valuable discussion on this.

In comparison to Hmieleski and Lerner's (2016) study, our sample is considerably smaller. However, experimental costs play a crucial role in this context, as we offer an incentive compatible elicitation framework in a controlled experimental setting. Based on Vernon Smith's (1976) *induced value theory* this reflects the quality of our data. To increase the sample size in a future study would certainly be desirable, in order to control for the robustness of these findings. In this context, it needs to be raised that within the experimental design some self-reported variables were elicited (in the questionnaire section). Against the background that some of these variables hold rather negative connotations (as for example in case of the *dark triad* and *unproductive entrepreneurial motives*), I cannot exclude the possibility of subjects answering in these instances in a socially desirable, rather than authentic way. This has been discussed in the paper, but for completeness should be raised in this section again.

The sequence of the experimental structure, specifically eliciting preferences first, followed by psychometric variables, might lead to internal validity concerns, based on *ordering effects*. That means that the answering of the psychometric variables could have been influenced by the elicitation of preferences. However, as has been described in detail in Lauritzen et al. (2020), there is no simple solution. The experimental structure was

consciously chosen, based on certain trade-offs, which frequently need to be made in experimental research. Here, an "uncontaminated" elicitation of the social preferences was prioritized. Similarly, since the measure of altruism was collected in two different stages of the experiment (e.g., dictator game (1), 2-player public good game, dictator game (2)), there could be concerns regarding ordering effects in this context. All relevant regressions were consequently also run with a dummy variable, controlling for game order (see Lauritzen et al. (2020) for a detailed explanation on this). Results remain unchanged.

When using experimental studies, generalizability is something one should closely and critically consider. The debate of using economic and business students for decision-making experiments in general (e.g., Levitt and List 2007, Schade 2005), but also for the application of entrepreneurship, certainly has its limitations. However, given the importance of social and sustainable decision-making, particularly in a business context – I deem the subject pool of business and economics students appropriate and relevant for the purpose of this paper. Replicating the study with actual entrepreneurs in the future is certainly desirable.

For measuring the *dark triad*, the *dirty dozen* questionnaire by Jonason and Webster (2010) was chosen. As brevity is a strong feature of this measure, some critics (Lee et al., 2013; Maples et al., 2014) have raised concerns in regards to internal validity, while others support its validity (see Furnham et al., 2013). The main discussion thereby revolves around the question, whether the three components of the dark triad are sufficiently distinct from another (*discriminative validity*). For our purpose, the shortness of this questionnaire was important as to keep attention levels of subjects sufficiently high, given that they had already performed other tasks for about 40 minutes. Further, the wording of this measure was preferred to others, which can at times be somewhat insensitive. However, given that Akhtar et al. (2013) and Osumi and Ohira (2010) find *primary psychopathy* to be in particular relevant in both the context of social preferences as well as the context of entrepreneurship, the use of longer personality questionnaires, which distinguish between primary and secondary psychopathy could prove beneficial and lead to more distinguishable findings.

Finally, while this study investigates the effect of personality traits onto entrepreneurial motivations, one needs to keep in mind that beyond personality, there are a wide range of factors, such as institutions and social norms impacting the entrepreneur's role and her motivations and behavior (positive or negative) within society (see Baumol et al., 2006). The aim here was not to make, or claim to be able to make, a direct inference in relation to dark traits (in particular as we do not control for emotions in our experimental design). Yet, I do believe that this study can improve our understanding of entrepreneurial behavior and its relation to certain contexts.

5.7. Conclusion

Concluding, investigating the association of the dark triad and social preferences, exclusively for the trait of Machiavellianism a significant impact on cooperative tendencies was found. Investigating the dark triad in the context of occupational choice, I find the traits of psychopathy and Machiavellianism to significantly influence entrepreneurial intentions, albeit in opposite directions. The resulting implications were carefully discussed. The paper further determined a significant positive relationship of both psychopathic and narcissistic tendencies onto unproductive entrepreneurial motives. Combining the last two findings indicates that individuals with higher entrepreneurial intentions are generally not characterized by those dark personality traits, which can systematically be linked to unproductive entrepreneurial motives. Given the societal and environmental pressures on our planet, this is deemed good news.

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6. Appendices

6.1. Additional Material Essay No. 1

Experimental section for the description of the attributes

You are now in the second part of this experiment.

Your task is to imagine that you are the farmer in the respective scenario: with all his/her values and attitudes, with his/her farm and income expectations. This means, you imagine to have his/her income expectations in the respective situation, that you underlie the respective income fluctuations, that you have the same attitude towards the extent of the farm's external effects on the eco-system and that you share the same attitude towards the preservation of the fertility of the soil.

How much would you like to be in each specific scenario? Please place the scenario that you prefer most on rank 1. This is followed by the scenario that you prefer second most, et cetera. The scenario that you prefer least has to be placed on rank 8.

Please click on 'Continue'.

In the following, we will describe the aspects that constitute the different situations in more detail:

Aspect 1: Level of Income from agricultural activity

In the respective scenario the farm either generates a net annual average income (after taxes) of €60.000 (high income) or the farm generates a net annual average income (after taxes) of €20.000 (low income).

Aspect 2: Income Fluctuations

In the respective situation the farmer's income fluctuates either strongly or weakly.

If it fluctuates strongly, it is either 30% higher than the income stated in aspect 1, or 30% lower than the income stated in aspect 1.
Thus, if you have a high net income (€60.000), your income will either amount to €78.000 or €42.000 in the case of high fluctuations. If you have a low income (€20.000), your income will either amount to €26.000 or to €14.000 in the case of high fluctuations.

If it fluctuates weakly, it is either 10% higher than the income stated in aspect 1, or 10% lower than the income stated in aspect 1.
Thus, if you have a high net income (€60.000), your income will either amount to €66.000 or €54.000 in the case of low fluctuations. If you have a low income (€20.000), your income will either amount to €22.000 or to €18.000 in the case of

low fluctuations.
Note: Not all of the just mentioned combinations will be realized in the following scenario descriptions.

Aspect 3: Extend of the external effects produced by the farm onto the eco-system

Under externalities of the farm we understand its effects on e.g., ground water, air, etc. that are not compensated by the farmer in monetary (or any other) form (e.g., the farmer could pollute the ground water without fearing any consequences). Please note, that the external effects do not include the fertility of the own land. These consequences have to be borne by each farmer him/herself and will be covered in the next aspect (aspect 4).

In the specific scenario, the farmer is either interested in this aspect to a lesser extent ("*low interest*") or he/she shows a very *high* interest in this aspect.

Aspect 4: Preservation of the fertility of the soil

The fertility of the soil can be improved or destroyed by certain measures. We assume, in this aspect, that the farmer already has to bear the consequences of his/her respective activities during his/her lifetime (that means not only the predecessors, who are naturally affected as well).

In the specific scenario, the farmer is either interested in this aspect to a lesser extent ("*low interest*") or he/she shows a very *high* interest in this aspect.

After having explained the four aspects that constitute a specific scenario to you, we would like to ask you to imagine the 8 different scenarios, which you will have to bring into a preference order, in detail. Please carefully look at each scenario. On the next screen you will get an overview on the specific scenarios.

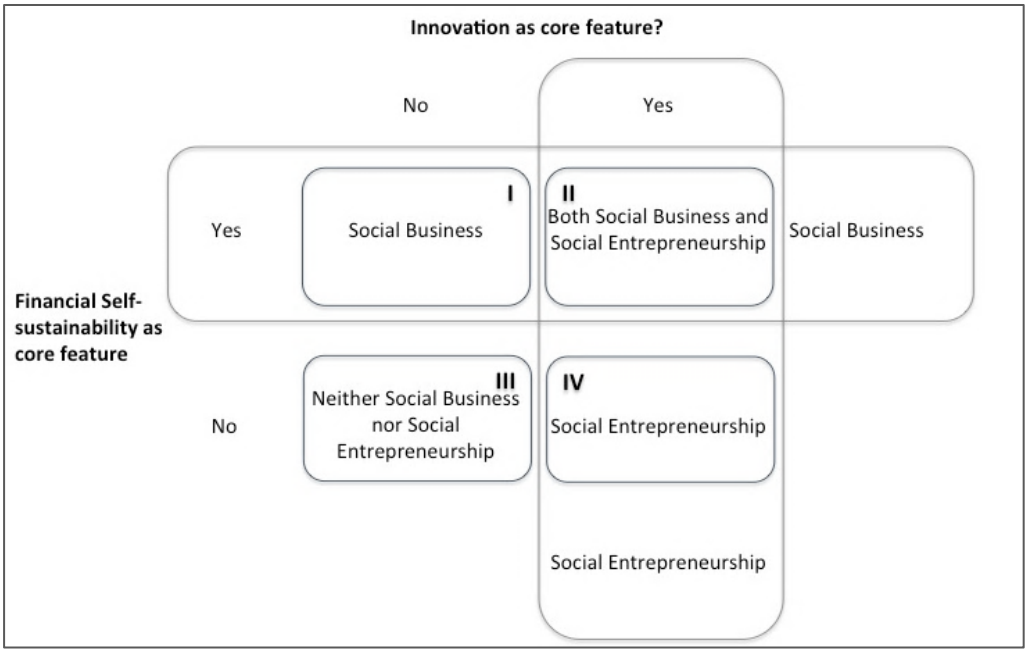
Please click "Continue" to get to the overview.

6.2. Additional Material Essay No.2

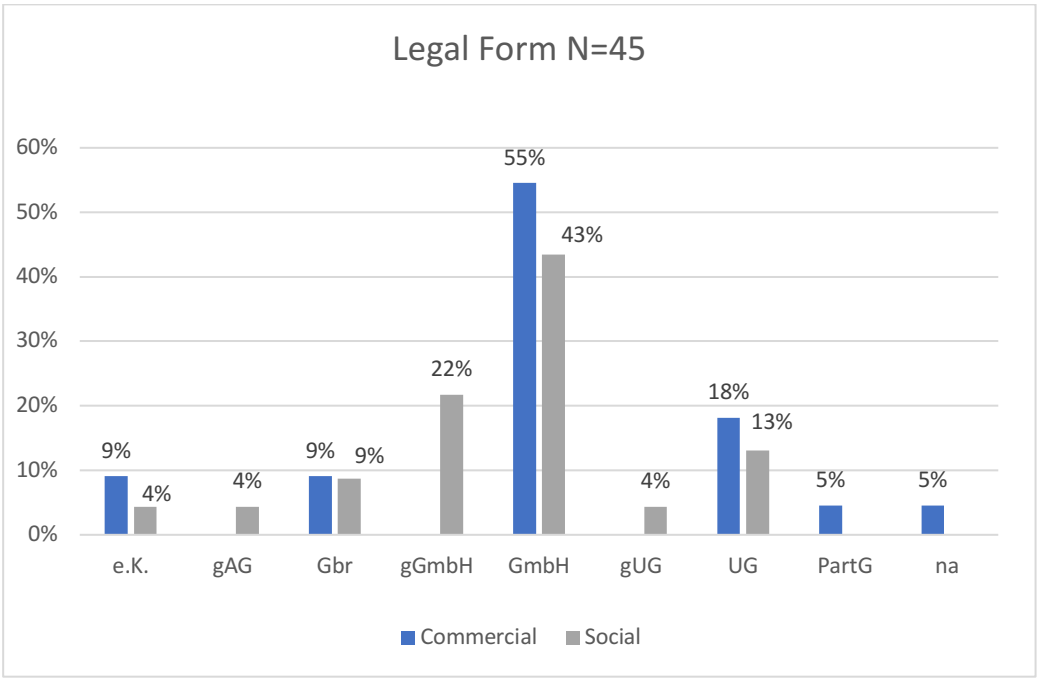
Table A I: Spectrum of social entrepreneurship (Peredo and McLean (2006))

Stage	Place of Social Goals	Role of Commercial Exchange	Example
1	Enterprise goals are exclusively social	No commercial exchange	Non-governmental organizations (NGOs)
2	Enterprise goals are exclusively social	Some commercial exchange, any profits directly to social benefit or in support of enterprise	Grameen Bank
3	Enterprise goals are chiefly social, but not exclusively	Commercial exchange; profits in part to benefit entrepreneur and/or supporters	Missouri Home Care
4	Social goals are prominent among other goals of the enterprise	Commercial exchange; profit-making to entrepreneur & others is strong objective	Ben & Jerry's
5	Social goals are among the goals of the enterprise, but subordinate to others	Commercial exchange; profit-making to entrepreneur & others is prominent or prime objective	„Cause-branding": Benefiting financial profitability by supporting social projects (e.g., Avon Breast Cancer initiative)

Figure A I: Matrix- for social business & social entrepreneurship (based on Beckmann et al., 2014, p.31)



Graph A I: Distribution of businesses' legal form



Graph A II: Education level of entrepreneurs

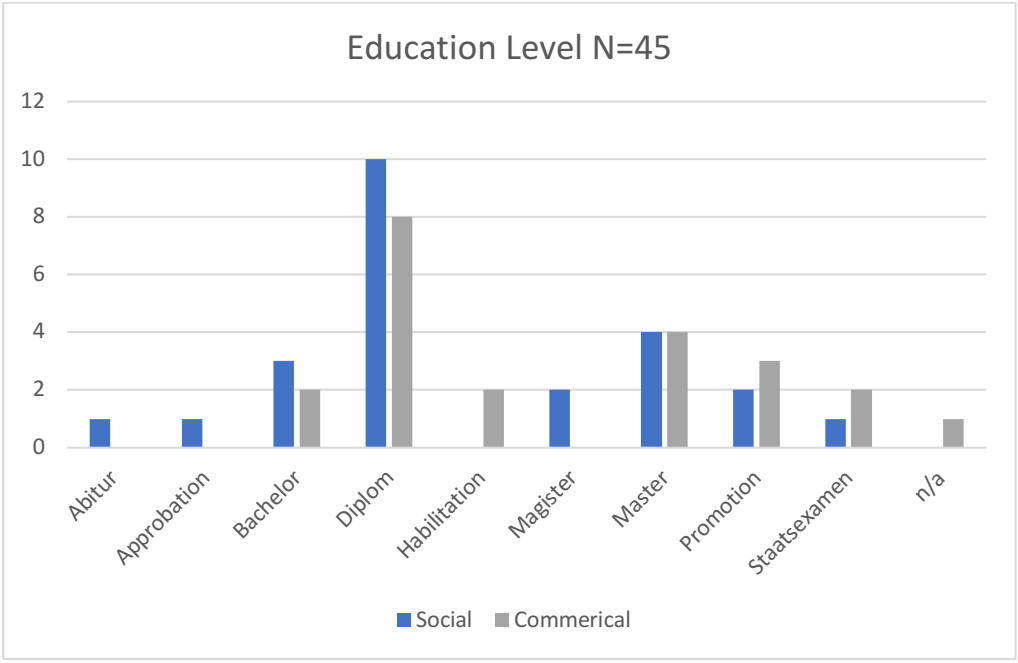


Table A II: Independent samples t-test for commercial and social businesse

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Sourcing	Equal variances assumed	13.721	.001	.702	43	.487
	Equal variances not assumed			.695	34.653	.492
Distribution	Equal variances assumed	1.560	.218	1.691	43	.098
	Equal variances not assumed			1.684	41.076	.100
Perception	Equal variances assumed	.229	.634	-.672	43	.505
	Equal variances not assumed			-.669	39.816	.508
Income	Equal variances assumed	10.834	.002	-1.101	43	.277
	Equal variances not assumed			-1.093	37.441	.282

Table A III: Std. deviation relative importance values of social & commercial business owners

Attribute	Std. deviation relative importance values	
	Commercial (n=22)	*Social (n=23)*
Income	28.13	19.68
Sourcing	23.4	14.41
Distribution	13.27	11.16
Perception	12.66	9.92

Figure A II: Dendrogram presenting the results of the cluster analysis

S

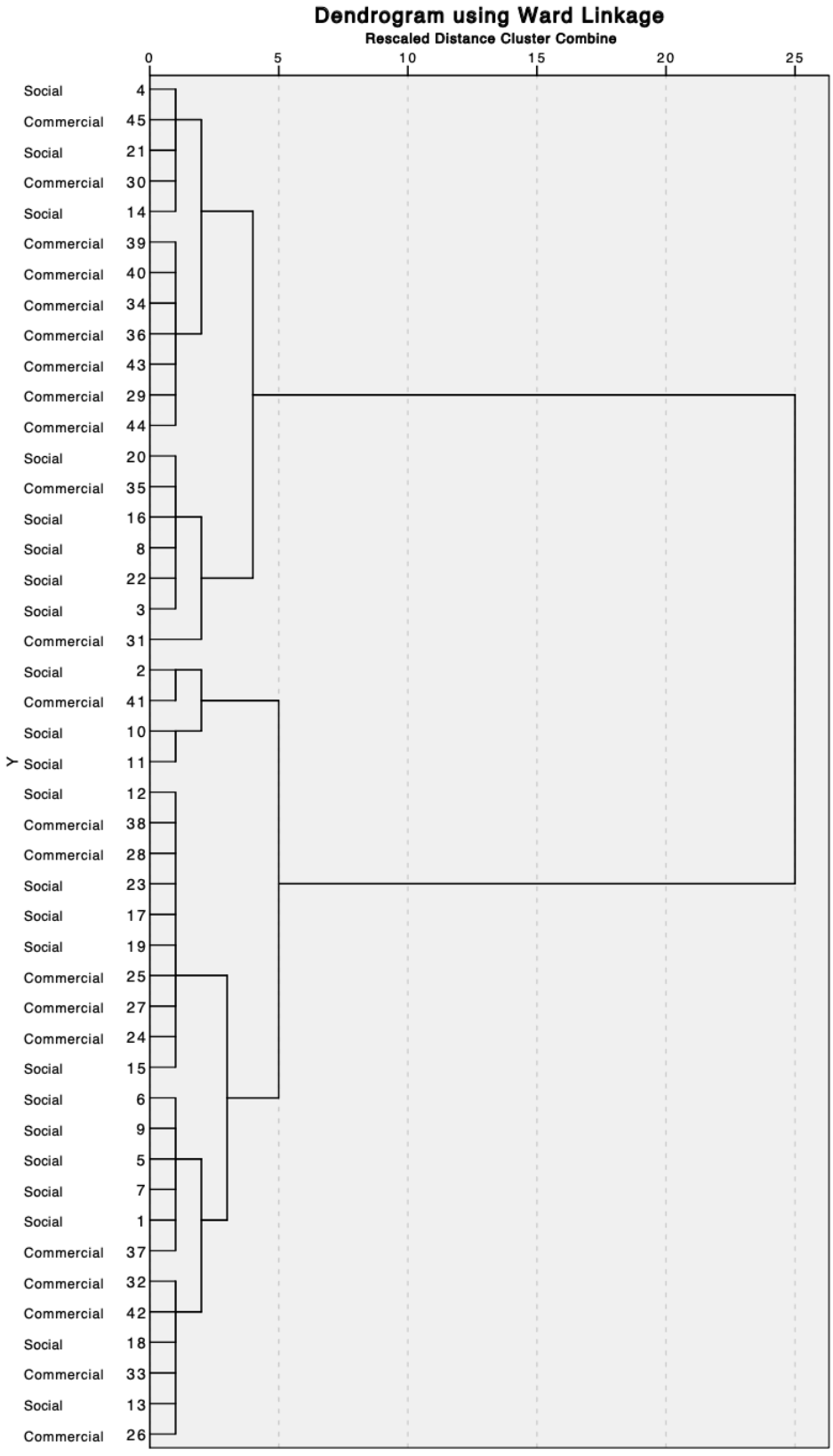


Table A IV: Comparison of test statistics for business types and clusters

	Entrepreneur (Cluster)		Business Type	
	Social (Cluster 1)	Money-driven (Cluster 2)	Social	Commercial
# of entrepreneurs	26	19	23	22
thereof commercial business owner	11 (42%)	11 (58%)		
thereof social business owner	15 (58%)	8 (42%)		
Conjoint Results (Average relative importance values)				
Income	11,6	55,6	26,3	34,2
Social Sourcing	46,8	20,6	37,7	33,6
Ecological Distribution	29,6	12,8	25,5	19,4
Perception	12,0	11,0	10,5	12,8
Descriptive Statistics				
Mean Age	39	36	37	38
Female ratio	42%	16%	35%	27%
Religiosity	15%	26%	30%	9%
Above-average social person (self-estimation)	73%	42%	83%	36%
I had a good business idea so I decided to found a business.	85%	58%	78%	68%
I wanted to found a business so I looked for a good business idea.	15%	42%	22%	32%

Table A V: Descriptives of attributes by cluster

Cluster 1 and Cluster 2 Values		N	Mean	Std. Deviation	Std. Error Mean
Social sourcing	1	26	46,752808	15,1531811	2,9717833
	2	19	20,587684	12,9045311	2,9605025
Ecological distribution	1	26	29,634231	10,6099940	2,0807910
	2	19	12,788421	7,2206016	1,6565196
Perception	1	26	12,039192	9,2476881	1,8136209
	2	19	11,022421	13,8212376	3,1708094
Income	1	26	11,570346	8,9258235	1,7504980
	2	19	55,601263	11,9454708	2,7404789

Table A VI: Independent samples t-test for clusters

		Test for Equality of		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Social sourcing	Equal variances assumed	,684	,413	6,081	43	,000	26,1651235	4,3024270	17,4884526	34,8417944
	Equal variances not assumed			6,238	41,912	,000	26,1651235	4,1947671	17,6992127	34,6310343
Ecological distribution	Equal variances assumed	,870	,356	5,975	43	,000	16,8458097	2,8195795	11,1595857	22,5320338
	Equal variances not assumed			6,334	42,834	,000	16,8458097	2,6596520	11,4815103	22,2101092
Perception	Equal variances assumed	,884	,352	,296	43	,769	1,0167713	3,4370696	-5,9147403	7,9482828
	Equal variances not assumed			,278	29,436	,783	1,0167713	3,6528417	-6,4493282	8,4828707
Income	Equal variances assumed	4,247	,045	-14,166	43	,000	-44,0309170	3,1081582	-50,2991155	-37,7627185
	Equal variances not assumed			-13,540	31,865	,000	-44,0309170	3,2518407	-50,6557969	-37,4060371

Figure A III: Online questionnaire - screen 1

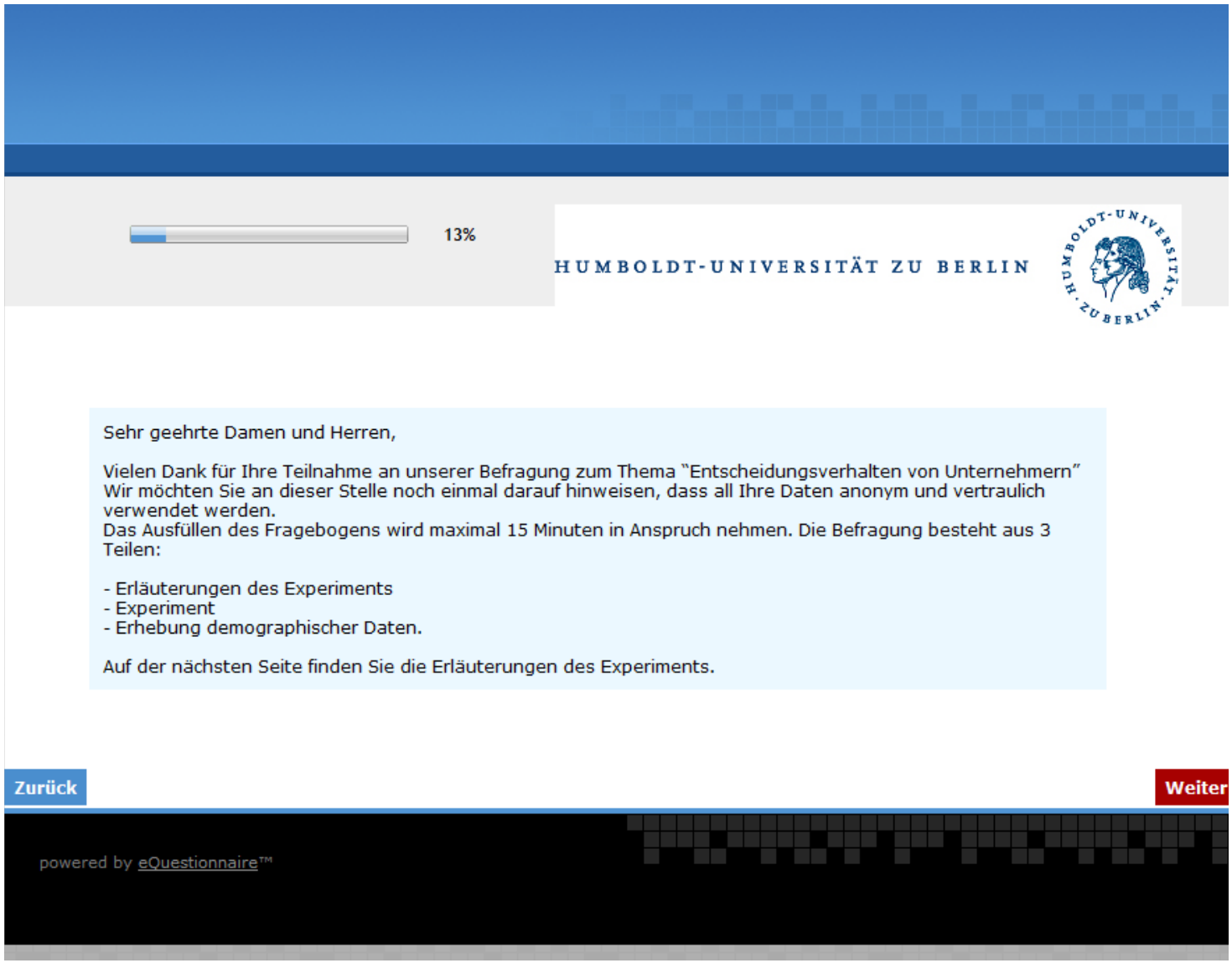


Figure A IV: Online questionnaire - screen 2

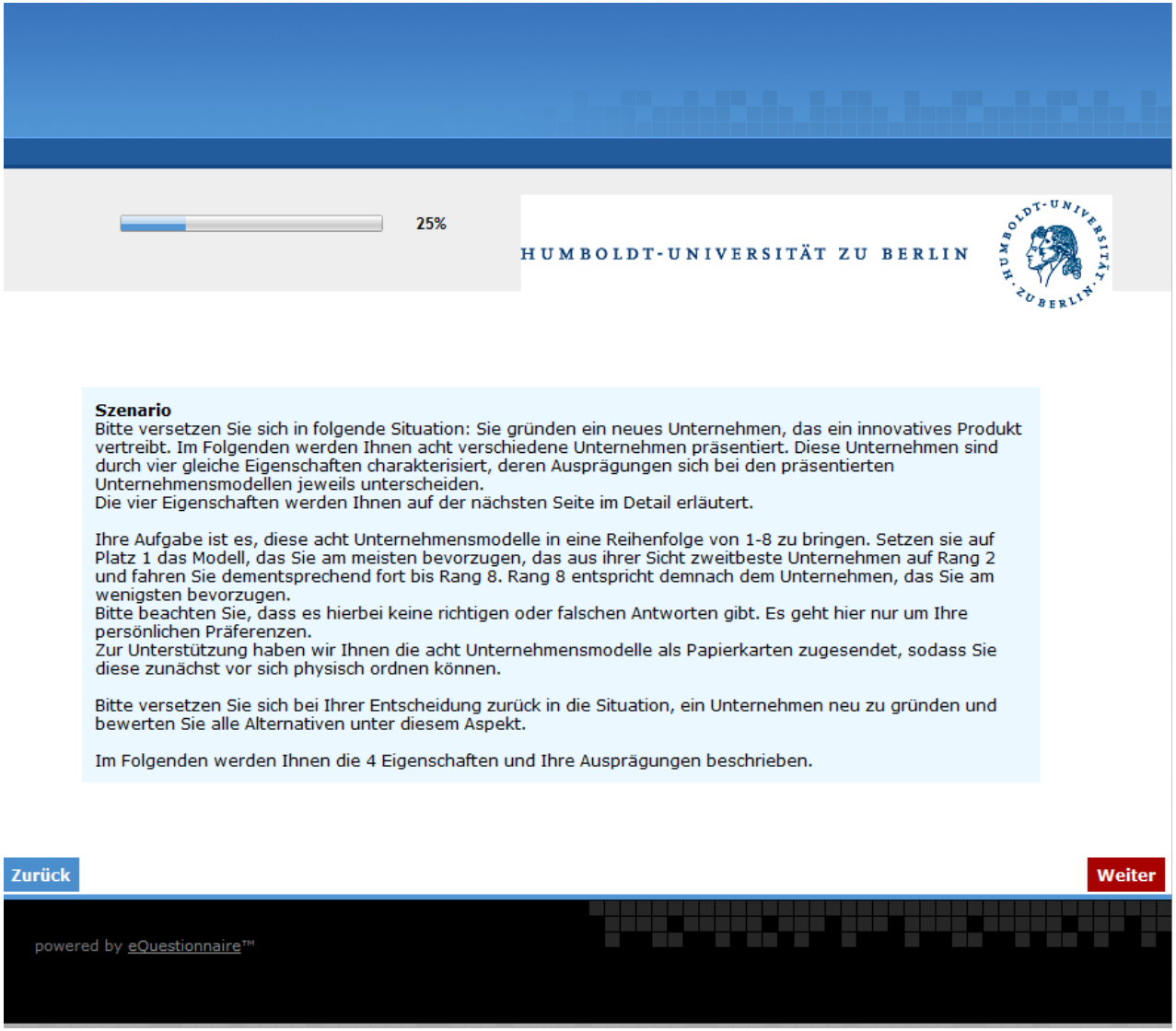


Figure A V: Online questionnaire - screen 3

Eigenschaft 1: Privat nutzbarer Gewinn nach Investitionen und Steuern pro Monat (netto)

Diese Eigenschaft beschreibt, wie viel Geld dem Unternehmer während der Gründungsphase des Unternehmens im Mittel pro Monat nach allen notwendigen Ausgaben, Investitionen und Steuern zur privaten Nutzung zur Verfügung steht. Dabei handelt es sich um einen Nettobetrag, das heißt Einkommenssteuer ist nicht mehr fällig. Es wird unterstellt, dass Sie als Gründer an einer langfristigen Entwicklung des Unternehmens interessiert und damit bereit sind, auf kurzfristig motivierte Gewinne zu verzichten.

Unter Berücksichtigung dieser Annahme ergeben sich folgende Ausprägungen:
• hoch (= 4500 €/Monat),
• mittel (= 3000 €/Monat) oder
• niedrig (= 1500 €/Monat).

Eigenschaft 2: Soziale Nachhaltigkeit der Beschaffungsprozessse

Einen Teil Ihrer Waren bzw. Dienstleistungen beschaffen Sie im Ausland. Das hat zur Folge, dass die in Deutschland üblichen Sozialstandards nicht notwendigerweise eingehalten werden.
Sie haben als Unternehmer bei der Gestaltung Ihrer Beschaffungsprozesse die Möglichkeit, Maßnahmen zu ergreifen, um deren soziale Nachhaltigkeit abzusichern. Diese Maßnahmen umfassen die Verpflichtung aller Lieferanten zur Unterzeichnung eines Verhaltenskodex, in dem diese versichern, die Menschenrechte einzuhalten, keine Kinder zu beschäftigen und für die Sicherheit Ihrer Arbeitnehmer zu sorgen. Die Einhaltung des Kodex wird durch Ihr Unternehmen kontrolliert.

Sie können sich entscheiden,
• diese Maßnahmen zu ergreifen (= sozial nachhaltige Beschaffung) oder
• dies nicht zu tun (= konventionelle Beschaffung).

Eigenschaft 3: Ökologische Nachhaltigkeit des Vertriebs

Sie haben die Möglichkeit, Maßnahmen zu ergreifen, um Ihre Vertriebsprozesse ökologisch nachhaltig zu gestalten. Dazu zählen unter anderem: Verwendung recyclebarer Verpackungsmaterialien, Auslieferung über Schienenverkehr statt LKW und wenn möglich die Nutzung der Bahn statt PKW/ Flugzeug für Geschäftsreisen (z.B. zu Kunden).

Sie können sich entscheiden,
• diese Maßnahmen zu ergreifen (= ökologisch nachhaltiger Vertrieb) oder
• dies nicht zu tun (= konventioneller Vertrieb).

Eigenschaft 4: Wahrnehmung des Unternehmers in der Gesellschaft

Diese Eigenschaft beschreibt, ob Ihre Person für Ihr gesellschaftlich verantwortungsvolles Handeln als Unternehmer wahrgenommen wird oder nicht (unabhängig davon, ob es den Tatsachen entspricht).

Ihre Person kann entweder
• für ihr gesellschaftlich verantwortungsvolles Handeln als Unternehmer von der Gesellschaft wahrgenommen werden
(= Ihre gesellschaftliche Verantwortung wird von anderen wahrgenommen.) oder
• für ihr gesellschaftlich verantwortungsvolles Handeln als Unternehmer von der Gesellschaft nicht wahrgenommen werden
(= Ihre gesellschaftliche Verantwortung wird von anderen nicht wahrgenommen.)

Figure A VI: Online questionnaire - screen 4

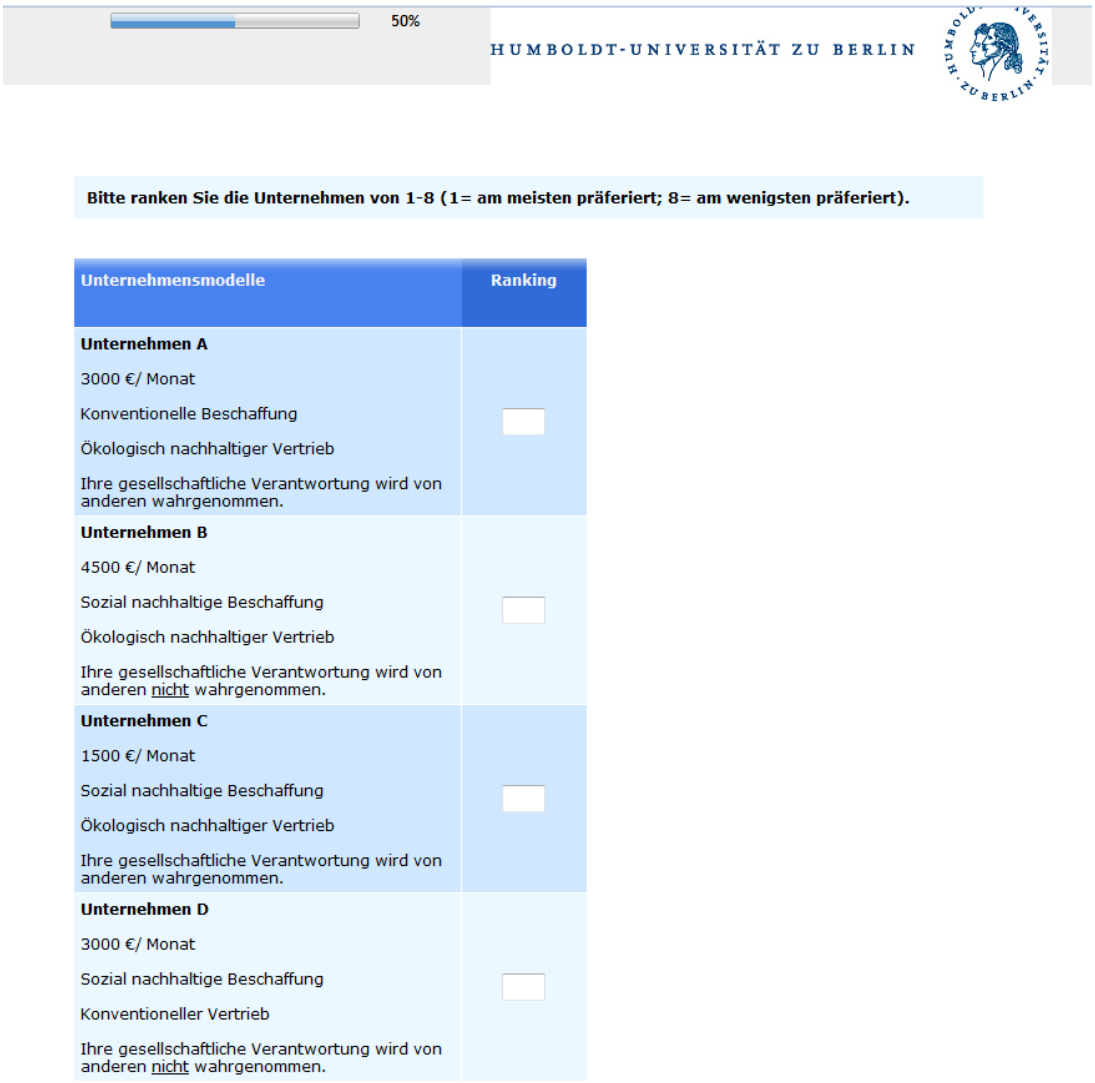


Figure A VII: Online questionnaire - screen 5

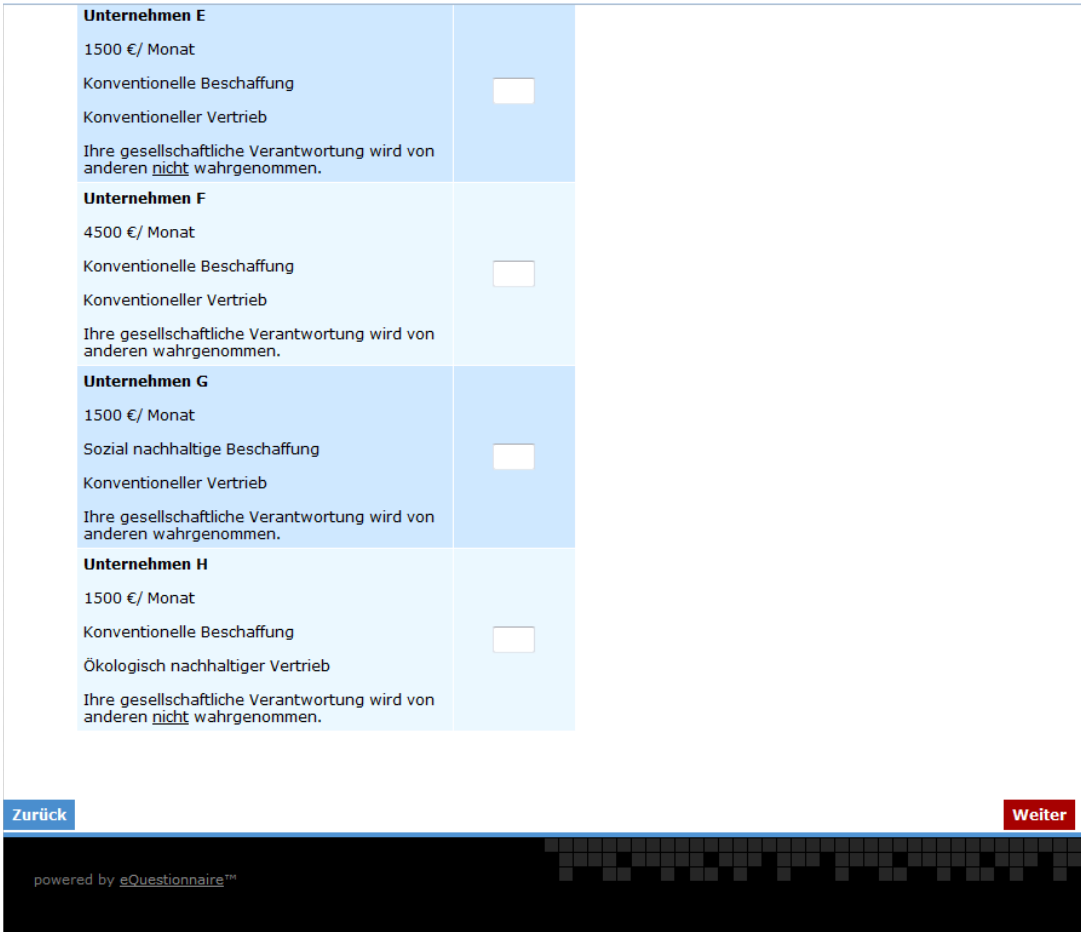


Figure A VIII: Online questionnaire - screen 6

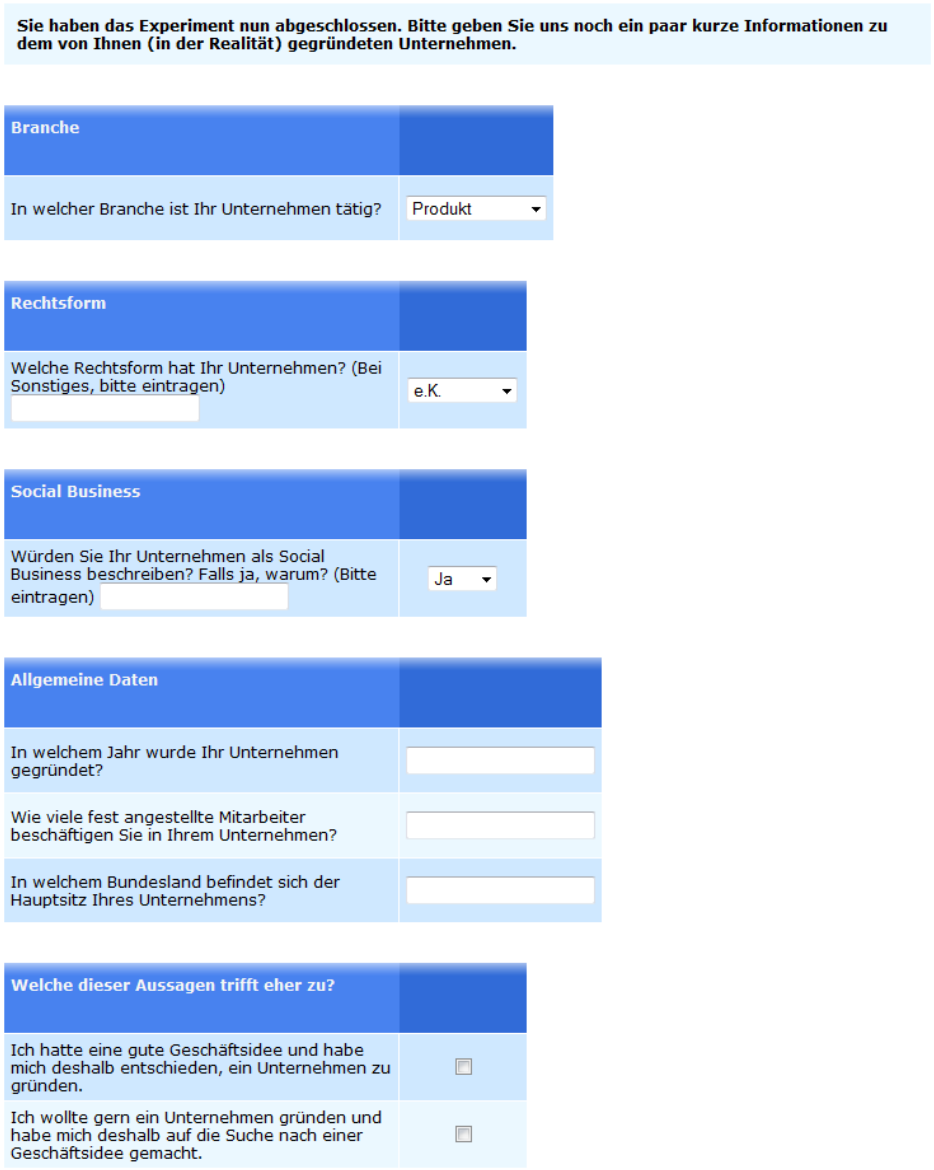
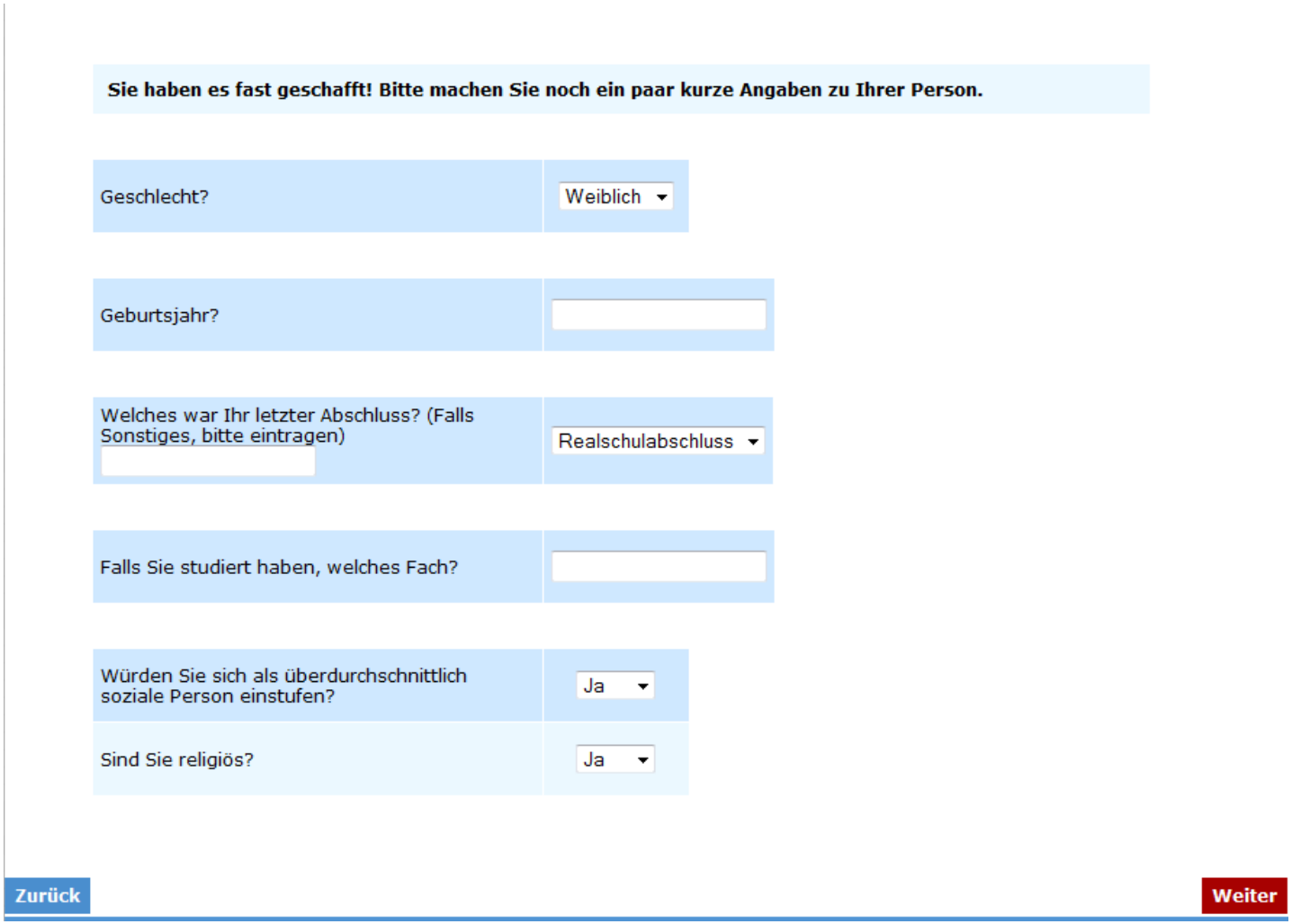


Figure A IX: Online questionnaire - screen 7



6.3. Additional Material Essay No. 3

Questionnaire – Supplementary material

Table A VII: World values survey

Subjects were asked to rate on 6 point Likert scale whether item's description is: 1 ('not at all like me') to 6 ('very much like me')

Value	WVS Item	Defining Goal (Schwartz, 2012 (p.5))
Universalism	Looking after the environment is important to this person; to care for nature.	Understanding, appreciation, tolerance, and protection for the welfare of all people and for nature.
Benevolence	It is important to this person to help the people nearby; to care for their well-being.	Preserving and enhancing the welfare of those with whom one is in frequent personal contact (the 'in-group').
Conformity	It is important to this person to always behave properly; to avoid doing anything people would say is wrong.	Restraint of actions, inclinations, and impulses likely to upset or harm others and violate social expectations or norms.
Tradition	Tradition is important to this person; to follow the customs handed down by one's region or family.	Respect, commitment, and acceptance of the customs and ideas that one's culture or religion provides.
Security	Living in secure surroundings is important to this person; to avoid anything that might be dangerous.	Safety, harmony, and stability of society, of relationships, and of self.
Power	It is important to this person to be rich; to have a lot of money and expensive things.	Social status and prestige, control or dominance over people and resources.
Achievement	Being very successful is important to this person; to have people recognize one's achievements.	Personal success through demonstrating competence according to social standards
Hedonism	It is important to this person to have a good time; to "spoil" oneself.	Pleasure or sensuous gratification for oneself.
Stimulation	Adventure and taking risks are important to this person; to have an exciting life.	Excitement, novelty, and challenge in life.
Self-Direction	It is important to this person to think up new ideas and be creative; to do things one's own way.	Independent thought and action--choosing, creating, exploring.

Table A VIII: Entrepreneurial self-efficacy

Subjects were asked to rate their abilities in comparison to their peers on 5-point likert scale for the given items (1 = a lot worse; 5 = much better).

Item description	Source	Factor and Variable Name
solve problems	Wilson et al. 2007	bt_solve_problems
manage money	Wilson et al. 2008	bt_manage_money
be creative	Wilson et al. 2009	c_be_creative
get people to agree with you	Wilson et al. 2010	bt_people_agree
be a leader	Wilson et al. 2011	bt_leader
make decisions	Wilson et al. 2012	bt_dec_making
successfully identify new business opportunities	Zhao et al. 2005	bt_opp_recog
create new products	Zhao et al. 2006	bt_new_products
think creatively	Zhao et al. 2007	c_think_creative
commercialize an idea or new development	Zhao et al. 2008	bt_comm_idea
raise funds for a new business	Monsen / Weitzel et al. 2010)	bt_raise_funds
sell a new idea or service	Monsen / Weitzel et al. 2010)	bt_sell_products

Table A IX: Trust (based on SOEP)

Subjects were asked to rate the following statements.	
Item description	Variable Name (based on Caliendo et al. 2010)
Main items: 4 point Likert Scale (1 = totally agree ; 4 = totally disagree)	
On the whole one can trust people (reversed item)	trustpeople
Nowadays one can't rely on anyone	canttrust
If one is dealing with stranger, it is better to be careful before you trust them	cautionstrangers
Supplementary Items (1) : 0=no (trust) ; 1 = yes (trust)	
Do you believe that most people would exploit you if they had the opportunity *(dfair=0)*, or would attempt to be fair toward you *(dfair=1)*?	dfair
Would you say that for most of the time, people attempt to be helpful *(dhelpful=1)*? Or only act in their own interests *(dhelpful=0)*?	dhelpful
Have you ever profited from the generosity of a person, who you had not previously met (*dprofitfromstranger=1; otherwise =0)*?	dprofitfromstranger
What would you say: how may close friends do you have? *(open scale question)*	numberfriends
Supplementary Items (2): 5 point Likert Scale (1 = very often ; 5 = never) How often does it occur that…	
…that you lend your friends your personal belongings (i.e., CDs, books, car, bicycle)?	lendbelongings
…that you lend your friends money?	lendmoney
…that you leave the door to your apartment unlocked?	doorunlocked

Table A X: High and low stakes in the dictator game

Dictator Game 1						
Allocation (in % of endowment) of dictator to receiver.						
	Obs	Mean	Std. Dev.	Min	Max	Wilcoxon Rank Sum Test
Entrepreneur	35	38.31%	17.54%	0	0.6	z=1.859; p=0.06
Start-up ECI	25	31.60%	19.13%	0	0.75	
High stake treatment						
Entrepreneur	23	34.65%	17.95%	0	0.5	z=0.6 ; p=0.54
Start-up ECI	18	33.89%	18.28%	0	0.75	
Low stake treatment						
Entrepreneur	12	45.33%	15.00%	0	0.6	z=2.154; p=0.03
Start-up ECI	7	25.71%	21.49%	0	0.5	
Students	32	26.38%	24.72%	0	0.98	
Dictator Game 2						
Allocation (in % of endowment) of dictator to receiver.						
	Obs	Mean	Std. Dev.	Min	Max	Wilcoxon Rank Sum Test
Entrepreneur	42	35.05%	25.37%	0	1	z=0.409; p=0.68
Start-up ECI	18	42.28%	28.84%	0	1	
High stake treatment						
Entrepreneur	32	38.03%	25.51%	0	1	z=0.148; p=0.88
Start-up ECI	9	39.44%	33.11%	0	1	
Low stake treatment						
Entrepreneur	10	25.50%	23.62%	0	0.5	z=1.377; p=0.16
Start-up ECI	9	45.11%	25.56%	0	1	
Students	32	14.92%	19.10%	0	0.5	

Table A XI: Regressions with the risk variable

DG1 & DG2 (merged): Individual contributions (as % of endowment): Tobit regressions

Variable	Entrepreneur vs. Non-Entrepreneur			Entrepreneur vs. Students			Non-entrepreneurs vs. Students			Dummy group variable		
Entrepreneur	0.009	0.074	0.0822	0.313***	0.289***	0.288***	-	-	-	-	-	-
	(0.0700)	(0.0710)	(0.0721)	(0.0678)	(0.0701)	(0.0692)						
Non-entrepreneur	-	-	-	-	-	-	0.247***	0.184**	0.148*	-0.04855	-0.10913	-0.132*
							(0.0782)	(0.0844)	(0.0845)	(0.0738)	(0.0788)	(0.0792)
Student	-	-	-	-	-	-	-	-	-	0.285***	0.280***	0.277***
										(0.0648)	(0.0660)	(0.0652)
Male	-0.011	-0.082	-0.0676	-0.192	-0.206	0.194***	-0.154	-0.207	0.196***	-0.134	-0.180	0.167***
	(0.0821)	(0.0871)	(0.0893)	(0.0711)	(0.0733)	(0.0726)	(0.0730)	(0.0754)	(0.0737)	(0.0607)	(0.0625)	(0.0622)
Risk	-	0.004	0.0031	-	-0.015	-0.0147	-	-0.003	-0.0032	-	-0.007	-0.00762
		(0.0151)	(0.0152)		(0.0128)	(0.0127)		(0.0165)	(0.0162)		(0.0119)	(0.0118)
Game Experience	-	-	-0.0439	-	-	-0.0902	-	-	-0.131*	-	-	-0.0882*
			(0.0643)			(0.0580)			(0.0752)			(0.0531)
Constant	0.347***	0.304***	0.313***	0.205***	0.299***	0.340***	0.180***	0.222**	0.284**	0.465***	0.525***	0.565***
	(0.0712)	(0.1159)	(0.116)	(0.0506)	(0.0933)	(0.0955)	(0.0540)	(0.1128)	(0.115)	(0.0683)	(0.0979)	(0.0999)
Sigma	0.271	0.235	0.234	0.299	0.282	0.278	0.321	0.306	0.298***	0.298	0.276	0.272***
	(0.0248)	(0.0241)	(0.0241)	(0.0254)	(0.0259)	(0.0255)	(0.0326)	(0.0338)	(0.0329)	(0.0224)	(-0.0227)	(0.0225)
Number of individuals	82	65	65	118	103	103	90	78	78	145	123	123
Log Likelihood	-25.970	-12.358	-12.125	-50.214	-39.635	-38.436	-43.503	-34.801	-33.303	-60.855	-44.611	-43.241
LR $\chi 2$	0.02	1.56	2.02	21.15	19.15	21.55	12.67	10.97	13.97	21.85	20.08	22.82
(Prob.>$\chi 2$)	0.988	0.669	0.732	0.000	0.000	0.000	0.002	0.012	0.007	0.000	0.001	0.000
Obs. censored at zero	13	12	12	36	33	33	31	29	29	40	37	37
Obs. censored at one	2	0	0	1	0	0	1	0	0	2	0	0

Standard errors in parentheses
*p<.1, ** p<.05, ***
p<.01

Table A XII: Regression DG1 & DG2 - without interaction effect and game order

DG1: Individual contributions (as % of endowment): Tobit regression		DG2: Individual contributions (as % of endowment): Tobit regression	
Entrepreneurial crowd	0.151**	Entrepreneurial crowd	0.401***
	(0.0653)		(0.0998)
Male	-0.102	Male	-0.163
	(0.0651)		(0.107)
Constant	0.252***	Constant	0.0973
	(0.0545)		(0.0829)
Sigma	0.255***	Sigma	0.336***
	(0.0255)		(0.0385)
Number of individuals	72	Number of individuals	72
Log Likelihood	-19.297	Log Likelihood	-37.979
LR $\chi 2$	6.23	LR $\chi 2$	15.81
(Prob.>$\chi 2$)	0.0444	(Prob.>$\chi 2$)	0.0004
Obs. censored at zero	16	Obs. censored at zero	24
Obs. censored at one	0	Obs. censored at one	2
Standard errors in parentheses *p<.1, ** p<.05, *** p<.01		Standard errors in parentheses *p<.1, ** p<.05, *** p<.01	

Table A XIII: Impact of social business on allocation choices in dictator game

Tobit regression — Number of obs = 55; LR chi2(3) = 0.83; Prob > chi2 = 0.8428; Log likelihood = -16.235269; Pseudo R2 = 0.0249

give_index	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
gender	-.0795317	.128525	-0.62	0.539	-.3374361	.1783727
game_order						
PG game experience	.0388791	.076311	0.51	0.613	-.1142501	.1920083
how_social	-.0113064	.0200669	-0.56	0.576	-.0515736	.0289608
_cons	.4336207	.1293391	3.35	0.001	.1740828	.6931587
/sigma	.2645285	.0295994			.205133	.323924

9 left-censored observations at give_index <= 0
45 uncensored observations
1 right-censored observation at give_index >= 1

Table A XIV: Tobit regression dictator game - Psychometric variables for entrepreneurs only

Tobit regression				Number of obs	= 55
				LR chi2(4)	= 11.29
				Prob > chi2	= 0.0235
Log likelihood = -11.004553				Pseudo R2	= 0.3390

give_index	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
gender						
male	-.1164688	.1174361	-0.99	0.326	-.3522316	.1192941
creative_skills	.0769164	.0412626	1.86	0.068	-.0059218	.1597546
business_skills	-.2243013	.0673509	-3.33	0.002	-.3595139	-.0890887
game_order						
PG game experience	.0887236	.0704107	1.26	0.213	-.0526318	.230079
_cons	.9171493	.255392	3.59	0.001	.4044285	1.42987
/sigma	.2391222	.0266673			.1855854	.2926591

9 left-censored observations at give_index <= 0
45 uncensored observations
1 right-censored observation at give_index >= 1

Table A XV: Tobit regression dictator game - Psychometric variables for ECI only

Tobit regression				Number of obs	= 27
				LR chi2(4)	= 0.71
				Prob > chi2	= 0.9503
Log likelihood = -8.949316				Pseudo R2	= 0.0381

give_index	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
gender						
male	.049963	.1156429	0.43	0.670	-.1892625	.2891885
creative_skills	-.0103735	.0838687	-0.12	0.903	-.1838691	.1631222
business_skills	-.0640747	.1114556	-0.57	0.571	-.2946382	.1664887
game_order						
PG game experience	.0481809	.1159417	0.42	0.682	-.1916627	.2880245
_cons	.5553713	.3970357	1.40	0.175	-.2659596	1.376702
/sigma	.2746163	.0440748			.1834406	.3657921

4 left-censored observations at give_index <= 0
22 uncensored observations
1 right-censored observation at give_index >= 1

Table A XVI: Median Split: Entrepreneurial intent and initial cooperation

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	32	.5775	.0670685	.3793968	.4407129	.7142871
1	30	.5046667	.0653105	.3577201	.3710918	.6382416
combined	62	.5422581	.0467203	.3678757	.4488351	.635681
diff		.0728333	.0937949		-.1147844	.2604511

diff = mean(0) - mean(1) t = 0.7765

Ho: diff = 0 degrees of freedom = 60

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0

Pr(T < t) = 0.7798 Pr(|T| > |t|) = 0.4405 Pr(T > t) = 0.2202

Table A XVII: Classification of subjects according to Isaac & Walker (1988)

	Entrepreneurs (E)	Professionals (SuP)	Students	Total
Freerider (n)	6	9	17	32
(expected frequency)	12.2	6	13.8	32
Cooperator (n)	49	18	45	112
(expected frequency)	42.8	21	48.2	112
Total	55	27	62	144
Pearson chi2(2) = 6.9702	p=0.031			
Fisher's exact	p=0.027			

Table A XVIII: Robustness check via clustered standard errors

Tobit regression — Number of obs = 1,368; F(6, 1362) = 12.67; Prob > F = 0.0000

Log pseudolikelihood = −1157.9689 — Pseudo R2 = 0.2057

(Std. Err. adjusted for 72 clusters in session_group_matching_pg)

give_index	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
give_other_index						
L1.	.8255145	.1800555	4.58	0.000	.4722984	1.178731
group_var						
professional-NE	−.1238441	.1461285	−0.85	0.397	−.4105055	.1628172
student	−.597568	.1514128	−3.95	0.000	−.8945955	−.3005404
give_other_index						
L1.	0	(omitted)				
group_var#cL.give_other_index						
professional-NE	−.113207	.2506321	−0.45	0.652	−.6048737	.3784597
student	.9226852	.2997415	3.08	0.002	.3346801	1.51069
gender						
male	−.0732046	.0998976	−0.73	0.464	−.2691744	.1227652
_cons	.2685437	.1303401	2.06	0.040	.0128545	.5242329
/sigma	.644948	.0703102			.50702	.782876

361 left-censored observations at give_index <= 0

597 uncensored observations

410 right-censored observations at give_index >= 1

Table A XIX: Psychometric variables in the cooperation game - initial cooperation.

Variable	Entrepreneurial crowd	Students
Male	0.399***	-0.0610
	(0.132)	(0.174)
Entrepreneurial Intent	-	-0.0278
		(0.0902)
Creative Skills	-0.0527	-0.0116
	(0.0683)	(0.111)
Business Skills	-0.0681	0.0641
	(0.104)	(0.161)
constant	0.904**	0.513
	(0.366)	(0.511)
Sigma	0.444	0.620
	(0.0503)	(0.0864)
Number of individuals	82	62
Log Likelihood	-59.923	-59.805
LR $\chi 2$	8.890	0.280
(Prob.>$\chi 2$)	0.031	0.990
Obs. censored at zero	4	11
Obs. censored at one	29	17

Standard errors in parentheses ; *p<.1, ** p<.05, *** p<.01

Table A XX: Cooperation over time for entrepreneurs only

Random-effects tobit regression — Number of obs = 527
Group variable: **subject_id** — Number of groups = 55

Random effects u_i ~ **Gaussian** — Obs per group:
min = 9
avg = 9.6
max = 10

Integration method: **mvaghermite** — Integration pts. = 12

Wald chi2(**4**) = 26.32
Log likelihood = **-434.21867** — Prob > chi2 = 0.0000

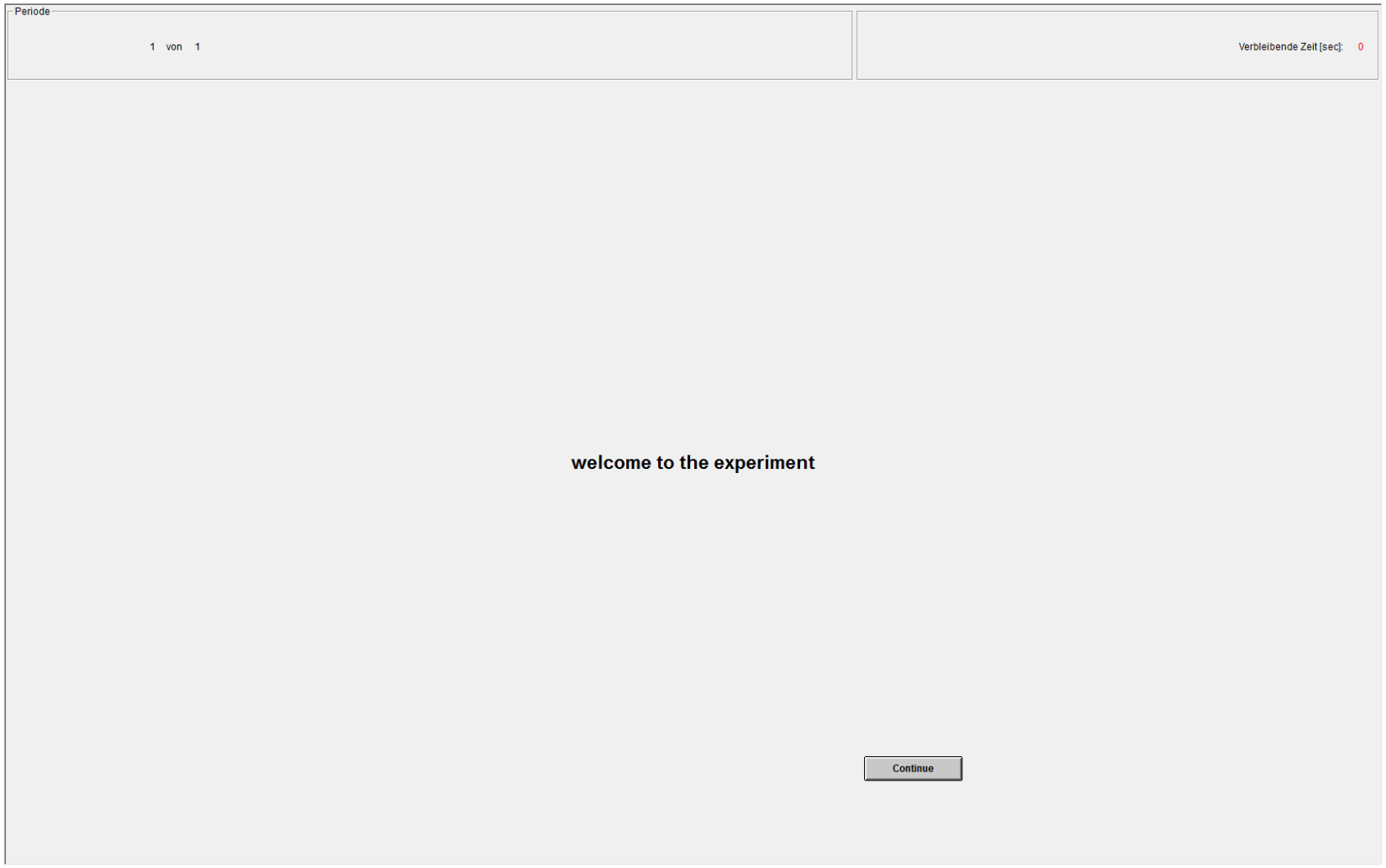
give_index	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
give_other_index						
L1.	.4338409	.090199	4.81	0.000	.2570541	.6106277
gender						
male	-.124369	.265961	-0.47	0.640	-.6456429	.396905
creative_skills	.0051474	.0901782	0.06	0.954	-.1715986	.1818934
business_skills	-.1970581	.1437572	-1.37	0.170	-.4788171	.0847009
_cons	1.278809	.5804408	2.20	0.028	.1411654	2.416452
/sigma_u	.4987749	.0663873	7.51	0.000	.3686583	.6288915
/sigma_e	.5300736	.0280064	18.93	0.000	.4751821	.5849651
rho	.469607	.0670083			.3422165	.6002159

101 left-censored observations
246 uncensored observations
180 right-censored observations

Table A XXI: Cooperation and psychometric variables

Variable	Entrepreneurial crowd	Students
Conditional Cooperation	0.467***	0.783***
	(0.0668)	(0.0932)
Male	-0.0409	0.0294
	(0.149)	(0.205)
Entrepreneur	0.243*	-
	(0.128)	
Entrepreneurial Intent	-	-0.0833
		(0.106)
Creative Skills	0.0347	0.157
	(0.0695)	(0.131)
Business Skills	-0.230**	0.0250
	(0.107)	(0.191)
constant	0.929**	-0.251
	(0.388)	(0.602)
Number of individuals	82	62
Number of observations	779	589
Obs. censored at zero	155	206
Obs. censored at one	232	178
Log Likelihood	-621.809	-284.434
Wald $\chi 2$	59.9	73.51
(Prob.>$\chi 2$)	0.000	0.000
Error Components:		
σ_u	0.446	0.728
σ_e	0.487	0.351
ρ	0.457	0.811

Experimental Design: Screenshot


Periode
1 von 1
Verbleibende Zeit [sec]: 0
welcome to the experiment
Continue

Welcome to this decision-making experiment and thank you for participating!

In the following, we will give you information and instructions regarding this experiment. Please read these carefully. Should you have any questions throughout the experiment, please simply raise your hand and one of our experimenters will gladly attend to you. We kindly ask you not to communicate with the other participants throughout the experiment and to mute your mobile phones. Thank you!

The experiment consists of **5 parts** and should take about **45 minutes** to complete. You will receive separate instructions in the beginning of each part.

In the **first part** you are going to play a **lottery** game. Thereby, it will be your task to decide between two lotteries several times.

In the **second, third and fourth part** you will play **different games**. Thereby, you will be randomly paired with different players from this room, but you will never find out who that person is. Depending on your decisions in these games, as well as the decisions of the other player, you can earn more or less money in this experiment. Each game you play is relevant for your payout. All payments will be made to you in private once the experiment is finished.

The determination of the respective payoffs will be explained to you in detail shortly.

In the **fifth and last part** of the experiment, you will be asked some general, e.g. demographic **questions** , about you as a person.

Please note that all information will be treated anonymously and strictly confidential.

We hope you enjoy the experiment and wish you good luck!

Please press **OK** to continue.

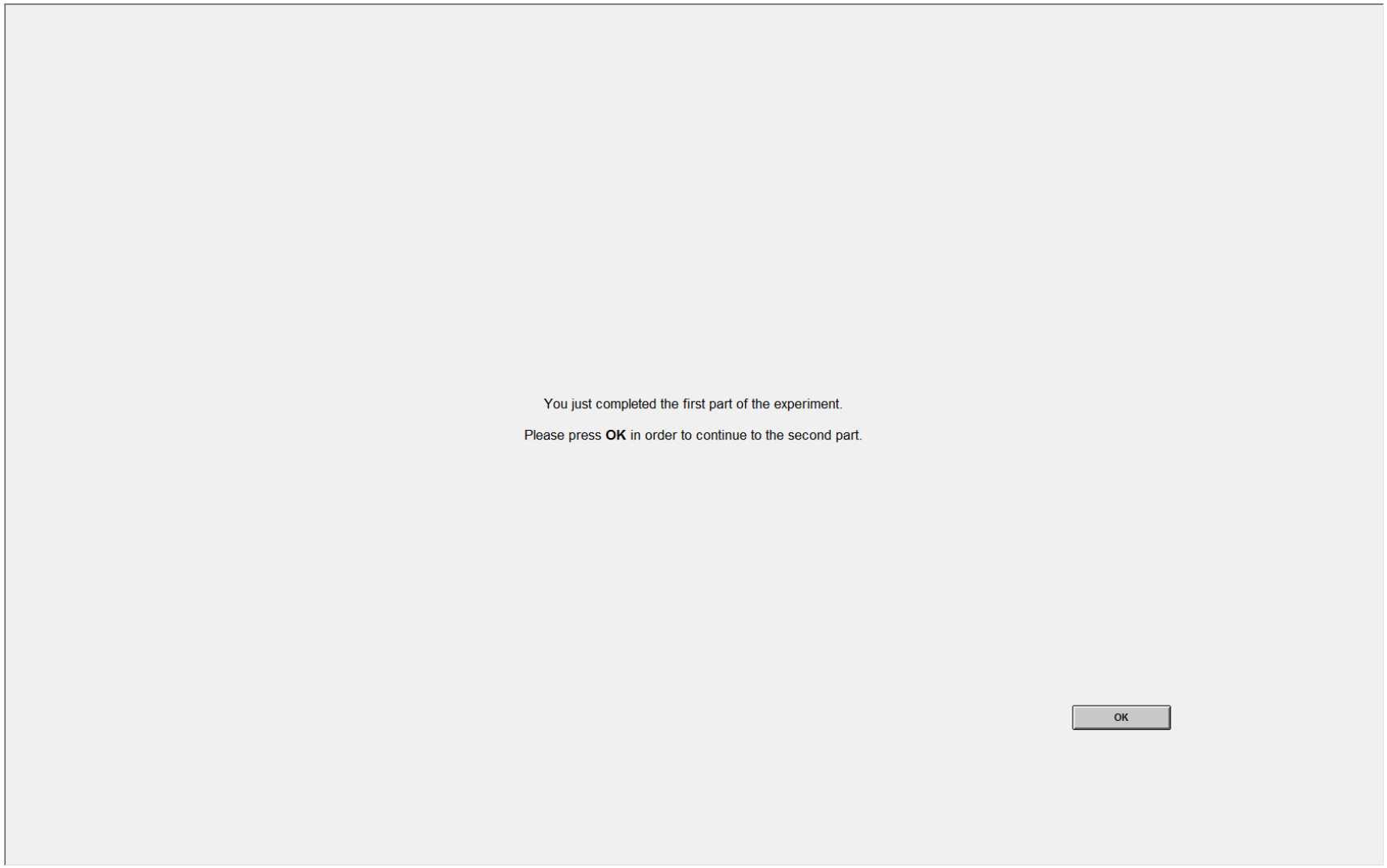
OK

You are now in the first part of the experiment:

In the following, we ask you to decide which one of the two lottery options presented, you would like to play: either choose lottery A or lottery B. Please make your decisions for each row, which means in every row you have to decide anew for option A or option B. At the end of the experiment a random draw mechanism will decide which of the 10 decisions will be relevant for your monetary compensation. You may use the available calculator (bottom right corner) if needed.

	Option A		Option B
1.	**A**: 10%: 8.00 EURO; 90%: 6.40 EURO	A ○ ○ B	**B**: 10%: 15.40 EURO; 90%: 0.40 EURO
2.	**A**: 20%: 8.00 EURO; 80%: 6.40 EURO	A ○ ○ B	**B**: 20%: 15.40 EURO; 80%: 0.40 EURO
3.	**A**: 30%: 8.00 EURO; 70%: 6.40 EURO	A ○ ○ B	**B**: 30%: 15.40 EURO; 70%: 0.40 EURO
4.	**A**: 40%: 8.00 EURO; 60%: 6.40 EURO	A ○ ○ B	**B**: 40%: 15.40 EURO; 60%: 0.40 EURO
5.	**A**: 50%: 8.00 EURO; 50%: 6.40 EURO	A ○ ○ B	**B**: 50%: 15.40 EURO; 50%: 0.40 EURO
6.	**A**: 60%: 8.00 EURO; 40%: 6.40 EURO	A ○ ○ B	**B**: 60%: 15.40 EURO; 40%: 0.40 EURO
7.	**A**: 70%: 8.00 EURO; 30%: 6.40 EURO	A ○ ○ B	**B**: 70%: 15.40 EURO; 30%: 0.40 EURO
8.	**A**: 80%: 8.00 EURO; 20%: 6.40 EURO	A ○ ○ B	**B**: 80%: 15.40 EURO; 20%: 0.40 EURO
9.	**A**: 90%: 8.00 EURO; 10%: 6.40 EURO	A ○ ○ B	**B**: 90%: 15.40 EURO; 10%: 0.40 EURO
10.	**A**: 100%: 8.00 EURO; 0%: 6.40 EURO	A ○ ○ B	**B**: 100%: 15.40 EURO; 0%: 0.40 EURO

OK


You just completed the first part of the experiment.
Please press **OK** in order to continue to the second part.
OK

Welcome to the second part of the experiment.

You are now playing another game. However, before commencing to play we will provide you with important information about the game and kindly ask you to read this information carefully.

For this game, you will be paired randomly and anonymously with another participant. One of you will be **Participant 1** and the other **Participant 2**. Prior to making a decision, you will learn your role, which will be randomly assigned by the computer.

There are 20 EUR to be split. Participant 1 will decide how many EUR she or he will retain. Then the rest will go to Participant 2. Please note: The 20 EUR are **real cash** and your split will be payoff relevant at the end of the experiment.

Your co-player is determined for this game only, for the subsequent games you will be randomly matched anew. Also, no money earned in this round can be transferred to the following games. You will receive a new endowment of money for each game .

Next, we ask you some comprehension questions to make sure you understand the game's payoff.

Please press **OK** to continue.

OK

Comprehension Questions

Please answer the following comprehension questions. As in the real experiment, there are 20 EUR to be split - unlike in the real experiment, in these comprehension questions the money and the split are hypothetical (not payoff relevant).

Suppose that Participant 1 decided to retain "A" Euro. What would be the payoffs for Participant 1 and 2 respectively?

Participant 1's payoff would be:

- A EUR
- 20 EUR
- 20 - A EUR

Participant 2's payoff would be:

- A EUR
- 20 EUR
- 20 - A EUR

OK

Comprehension Questions

Please answer the following comprehension questions. As in the real experiment, there are 20 EUR to be split - unlike in the real experiment, in these comprehension questions the money and the split are hypothetical (not payoff relevant).

Suppose that Participant 1 decided to retain "A" Euro. What would be the payoffs for Participant 1 and 2 respectively?

Participant 1's payoff would be:

- (•) A EUR
- ( ) 20 EUR
- ( ) 20 - A EUR

Participant 2's payoff would be:

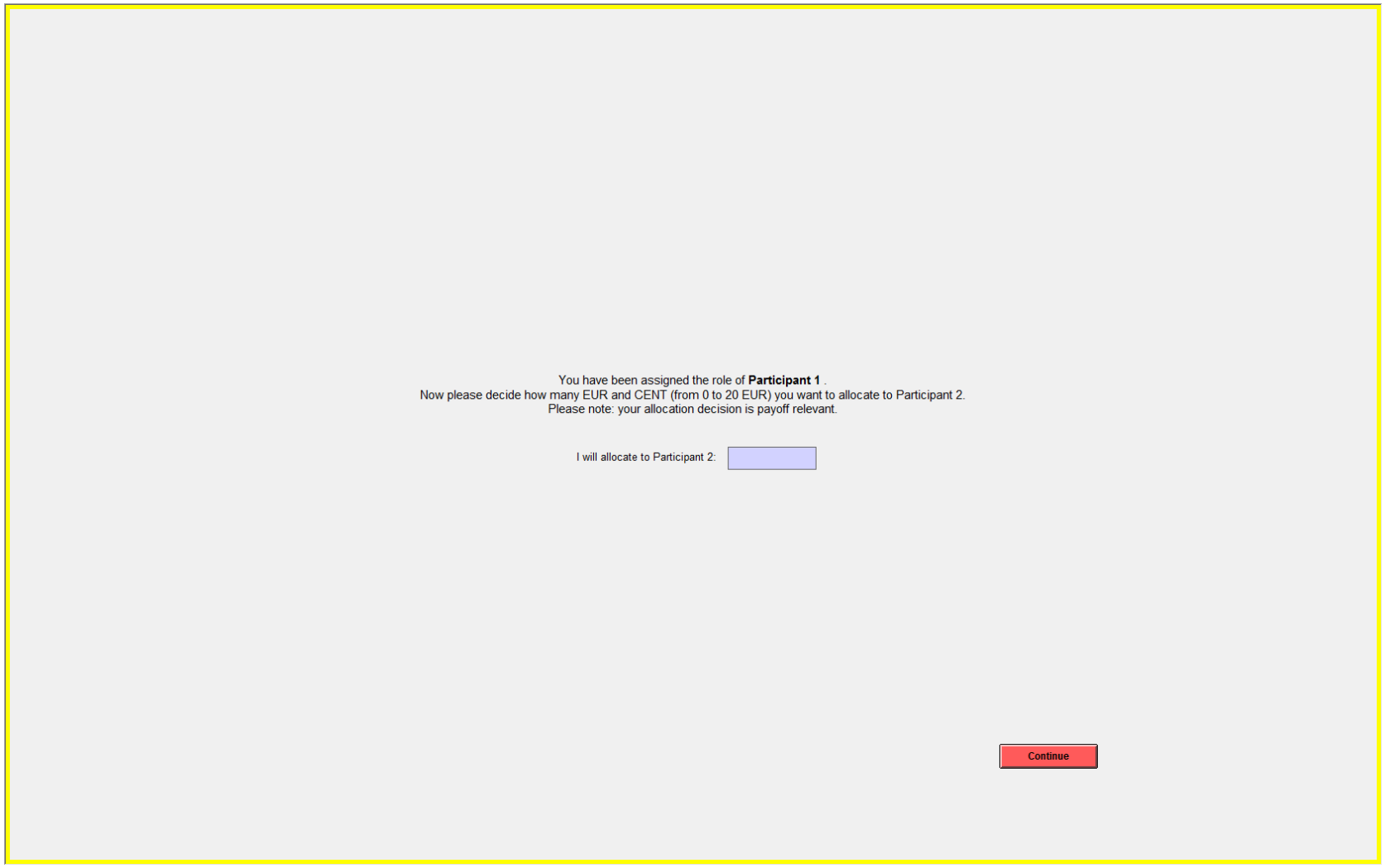
- ( ) A EUR
- ( ) 20 EUR
- (•) 20 - A EUR

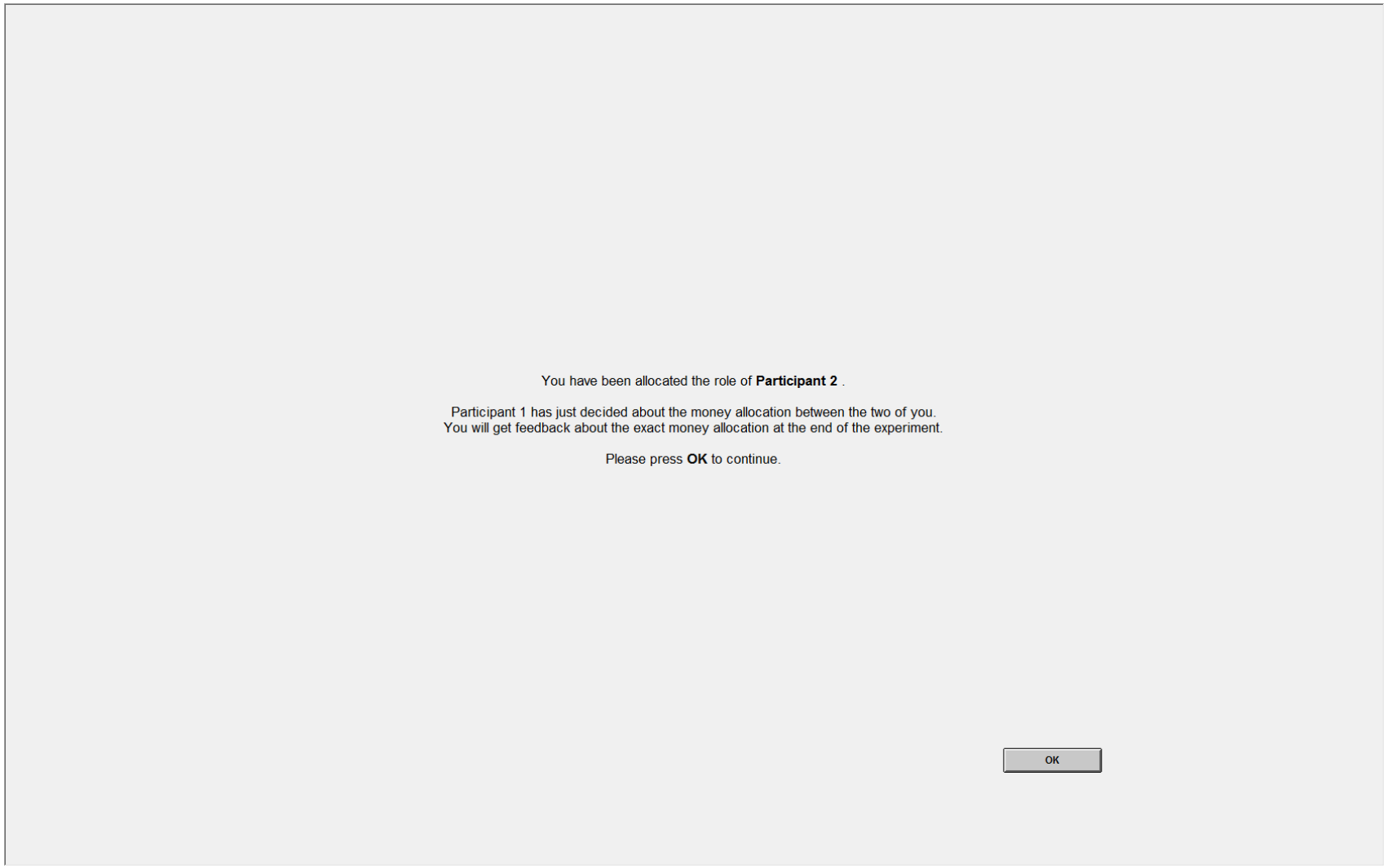
OK

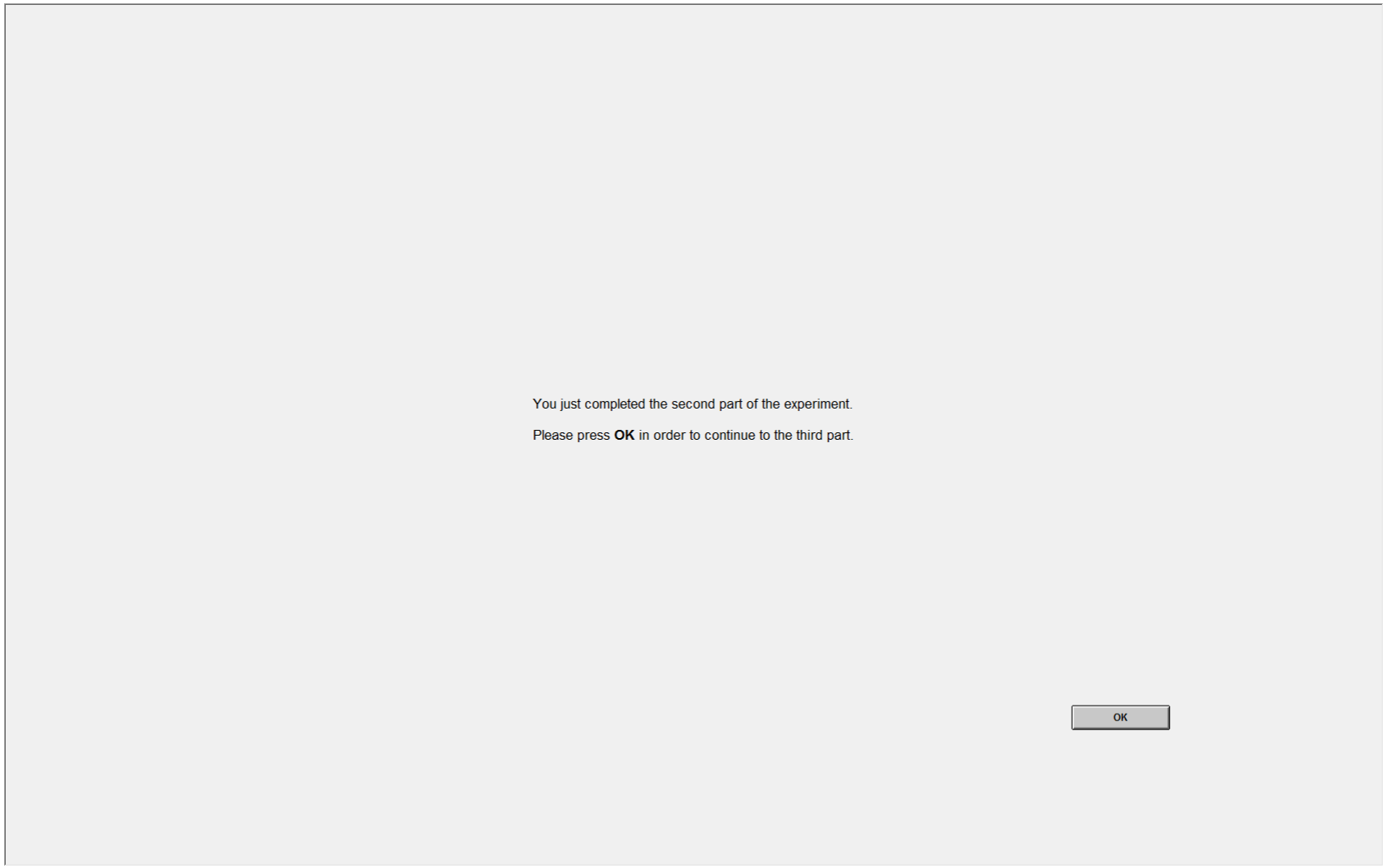
Great, you answered all comprehension questions correctly!
Next, it will be decided wether you will be allocated the role of participant 1 or participant 2.

Please press **OK** to continue.

OK


You have been assigned the role of **Participant 1** .
Now please decide how many EUR and CENT (from 0 to 20 EUR) you want to allocate to Participant 2.
Please note: your allocation decision is payoff relevant.
I will allocate to Participant 2:
Continue


You have been allocated the role of **Participant 2** .
Participant 1 has just decided about the money allocation between the two of you.
You will get feedback about the exact money allocation at the end of the experiment.
Please press **OK** to continue.
OK


You just completed the second part of the experiment.
Please press **OK** in order to continue to the third part.
OK

Welcome to the third part of the experiment!

Again, before proceeding to the next game, you will be given some information which we kindly ask you to read with care.

In this game, you will once again be randomly paired with one other player (your co-player). However, this time both of you make choices and the game is of a different type.

You and your co-player will be given an endowment of 20 EUR each.
Your task (and that of your co-player) is to decide how much of that money you want to invest in a project. The amount you decide not to contribute to the project, you keep for yourself.

The total payoff of this game consists of two parts:

Part 1: the amount you keep (don't invest in the project) & **Part 2: the income/return from the project** (based on what you and the other player invest). Thereby, the income from the project is calculated as the sum of your and your co-player's contribution to the project, multiplied by a factor of 0.7.

Thus: **Income from the project = 0.7 * (sum of contributions from both players)**

Next, we will illustrate the payoff function with several examples.

OK

Here are some examples that illustrate the payoff function in more detail:

Let's assume that both players receive an endowment of 20 € .

Example 1:
If both players decide to contribute nothing to the project, both their payoffs consists simply of their endowment, namely 20 € .

Example 2:
If both players decide to contribute 10 € (each) to the project, the payoff for each player amounts to 24 € . Why?
Because **part 1** of the payoff function, the amount you keep (endowment - contribution) equals **10 € = (20 € - 10 €).**
Additionally, the income from the project (**part 2** of the payout function) amounts to **14 € = 0.7*(10 € + 10 €)** for each player.
Thus, a player who puts 10 € in the project ends up with 24 € (14 € from the project plus the 10 € he kept) if the other player also invests 10 € .

Example 3:
Assume player A contributes 20 € to the project while player B decides to contribute nothing.
The income from the project (**part 2** of the payout function) is again 14 € = 0.7*(20 € + 0 €) for each player.
However, player A's **total payout** amounts to 14 € (her entire income consists of part 2 of the payout function, since the entire endowment was contributed to the project); while player B's payoff amounts to 34 € (adding the 20 € from part 1 of the payout function to the 14 € from part 2 of the payout function).

Now, let's look at a final example:
Assume both players contribute their entire endowment of 20 € to the project. In this case each player will receive a payoff of 28 € each. The entire payoff is determined by part 2 of the payoff function 28 € = 0.7*(20 € + 20 €) since the entire endowment was contributed.
Before commencing with the game, please answer the following comprehension questions in order to ensure you correctly understood the payout function. If there are any questions, please simply raise your hand.

Please press **OK** to continue.

OK

Comprehension Questions

Please answer the following comprehension questions. Please use the available calculator on the screen if required.

Let's assume an initial endowment of 20 EUR for all of the following comprehension questions and the explained payoff function. Please use decimal **points** instead of decimal commas in your answers.

Payout function:
Part 1 = Endowment - Contribution to project
Part 2 = Income from project = 0.7 * (sum of contribution of both players)
Total Income = Part 1 + Part 2

1. Suppose player A and player B each contribute 5 EUR to the project. What is the total payoff for player A and player B respectively?

for player A: 22

for player B: 22

2. Suppose player A contributes 5 EUR to the project, while player B contributes 10 EUR. What is the total payoff for player A and player B respectively?

for player A: 25,5

for player B: 20,5

3. Suppose player A and player B both contribute 15 EUR to the project. What is the total payoff for player A and player B respectively?

for player A: 26

for player B: 26

OK

Please note that you will play several rounds of this game!

Your co-player will remain the same for all these rounds.

After each round, you and your co-player will receive the following information:

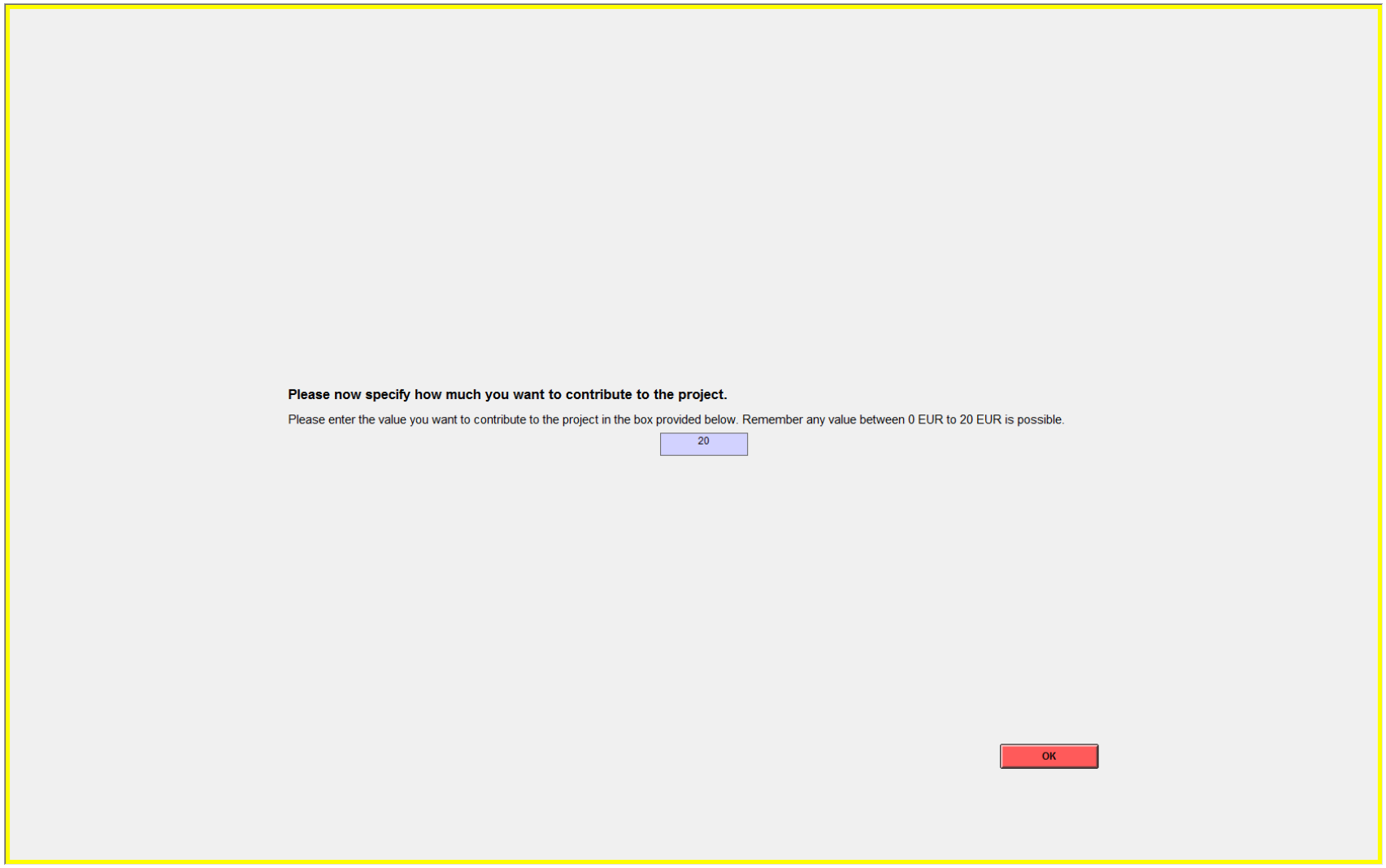
(a) your contribution
(b) your co-players contribution
(c) your potential payoff from this round

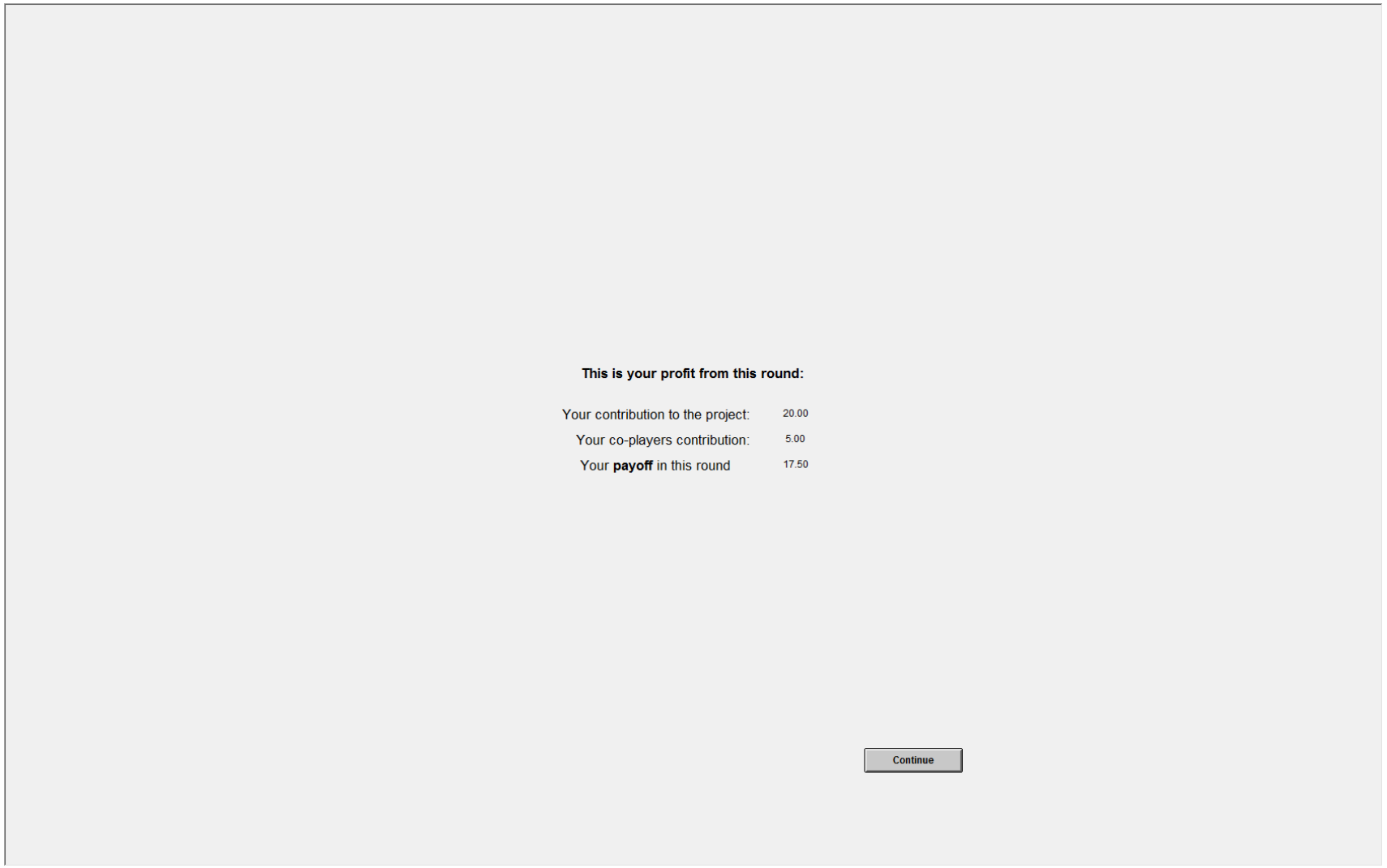
Please note that one round of all the rounds you play, will be randomly selected by the computer after the game. The payoff you achieved in this round will be paid out.

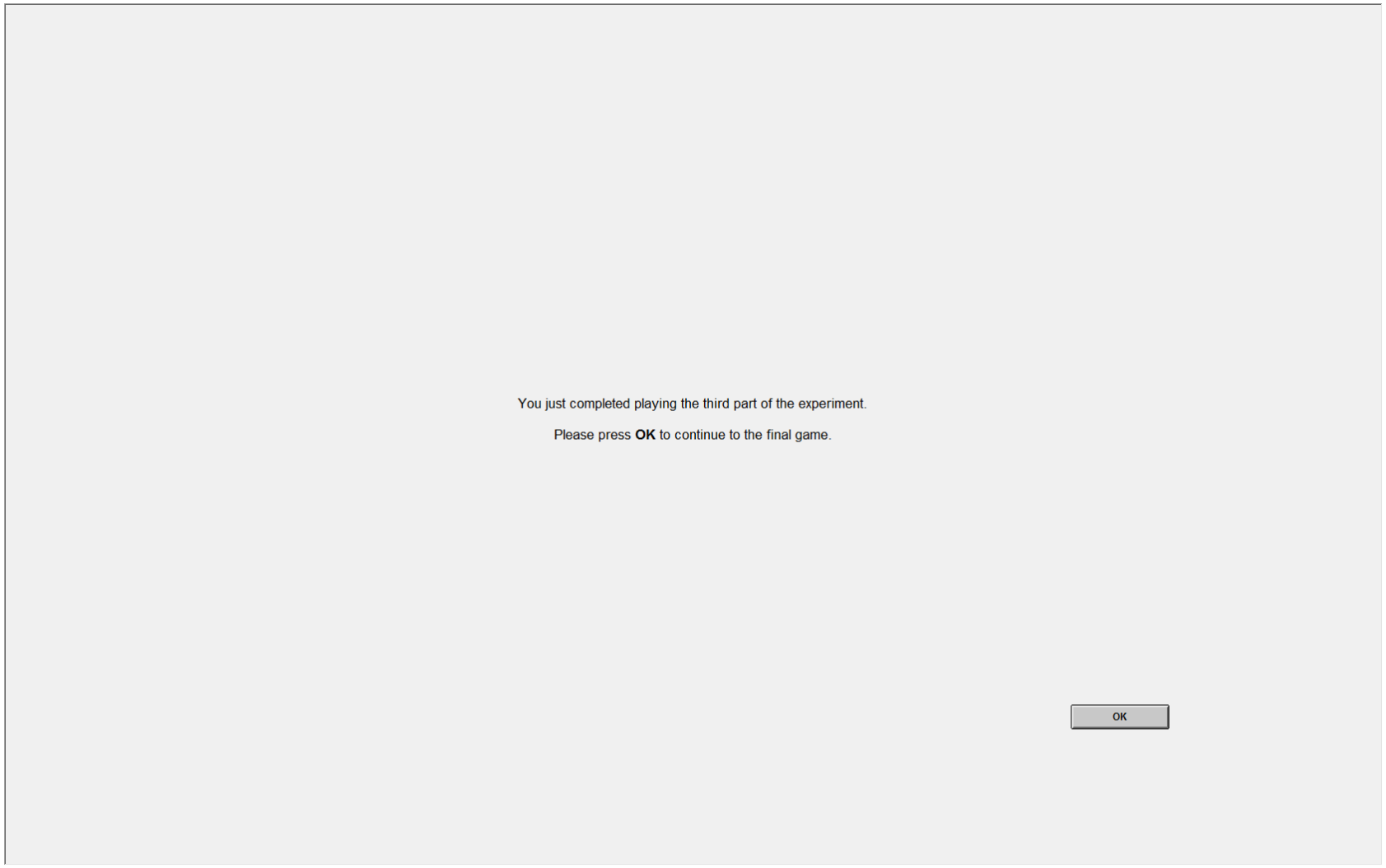
One last thing: At the beginning of each round, the scenario starts anew. In other words, at the beginning of each round you receive again an endowment of 20 EUR - irrespective of what happened in the previous rounds (i.e. you cannot accumulate payoffs across rounds). Please note: the endowment in the respective round will only be real (real cash) if that round is randomly selected for payoff.

Please press **OK** to continue.

OK


Please now specify how much you want to contribute to the project.
Please enter the value you want to contribute to the project in the box provided below. Remember any value between 0 EUR to 20 EUR is possible.
20
OK


This is your profit from this round:
Your contribution to the project: 20.00
Your co-players contribution: 5.00
Your payoff in this round 17.50
Continue


You just completed playing the third part of the experiment.
Please press **OK** to continue to the final game.
OK

You are now in the fourth part of the experiment.

The game in this part is identical to the game you played in the second part of the experiment. However, this time you will be allocated the opposite role as before. So, if you were previously Participant 1 you will now be Participant 2 and vice versa.

Please note: the counter-player is most likely not the same as in part 2 but will be randomly matched anew by the computer.

There are again 20 EUR to be split. Participant 1 will decide how many EUR she or he will retain. The rest will go to Participant 2 .

Please press **OK** to continue.

OK

You are now in the fourth part of the experiment.

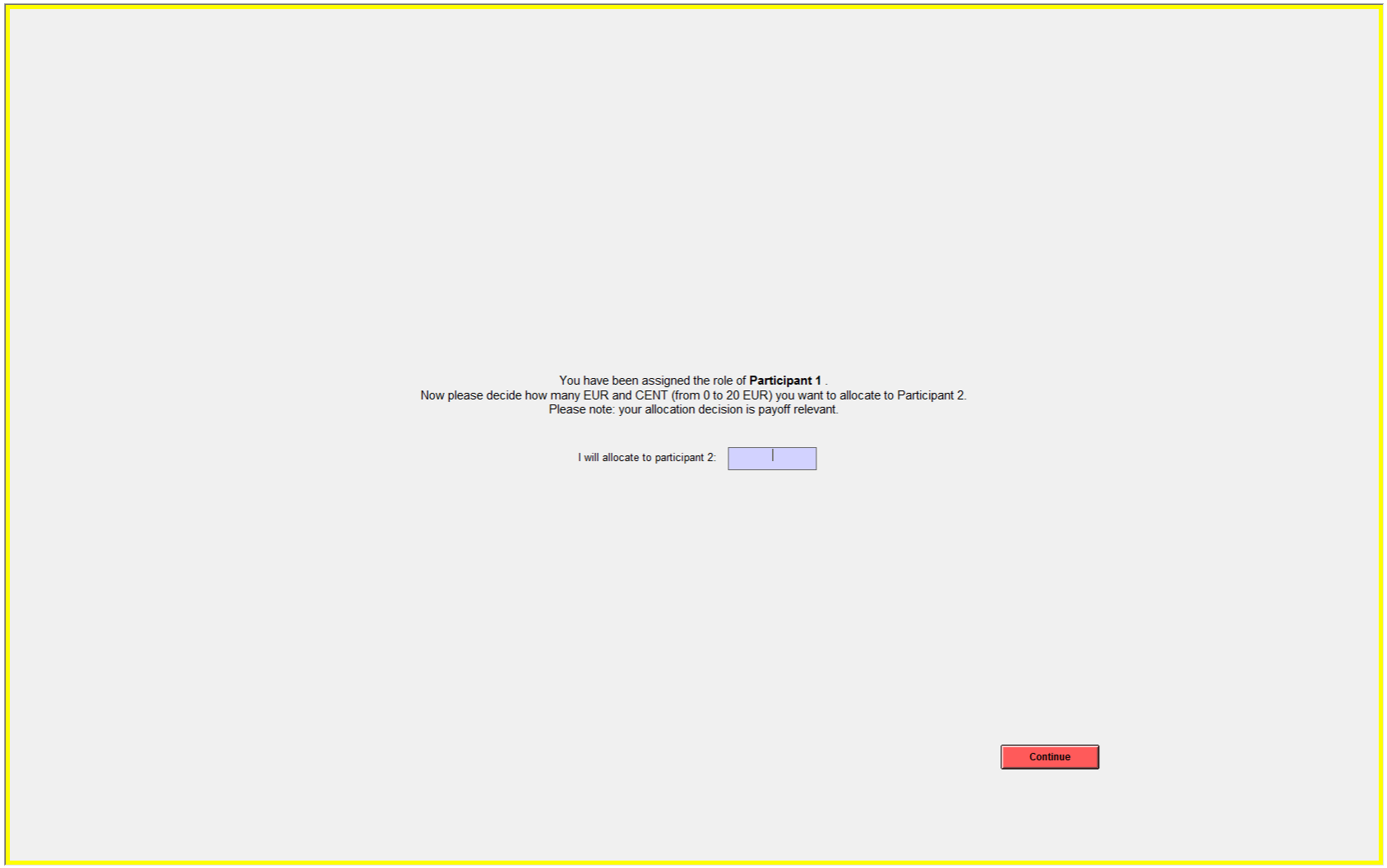
The game in this part is identical to the game you played in the second part of the experiment. However, this time you will be allocated the opposite role as before. So, if you were previously Participant 1 you will now be Participant 2 and vice versa.

Please note: the counter-player is most likely not the same as in part 2 but will be randomly matched anew by the computer.

There are again 20 EUR to be split. Participant 1 will decide how many EUR she or he will retain. The rest will go to Participant 2 .

Please press **OK** to continue.

OK

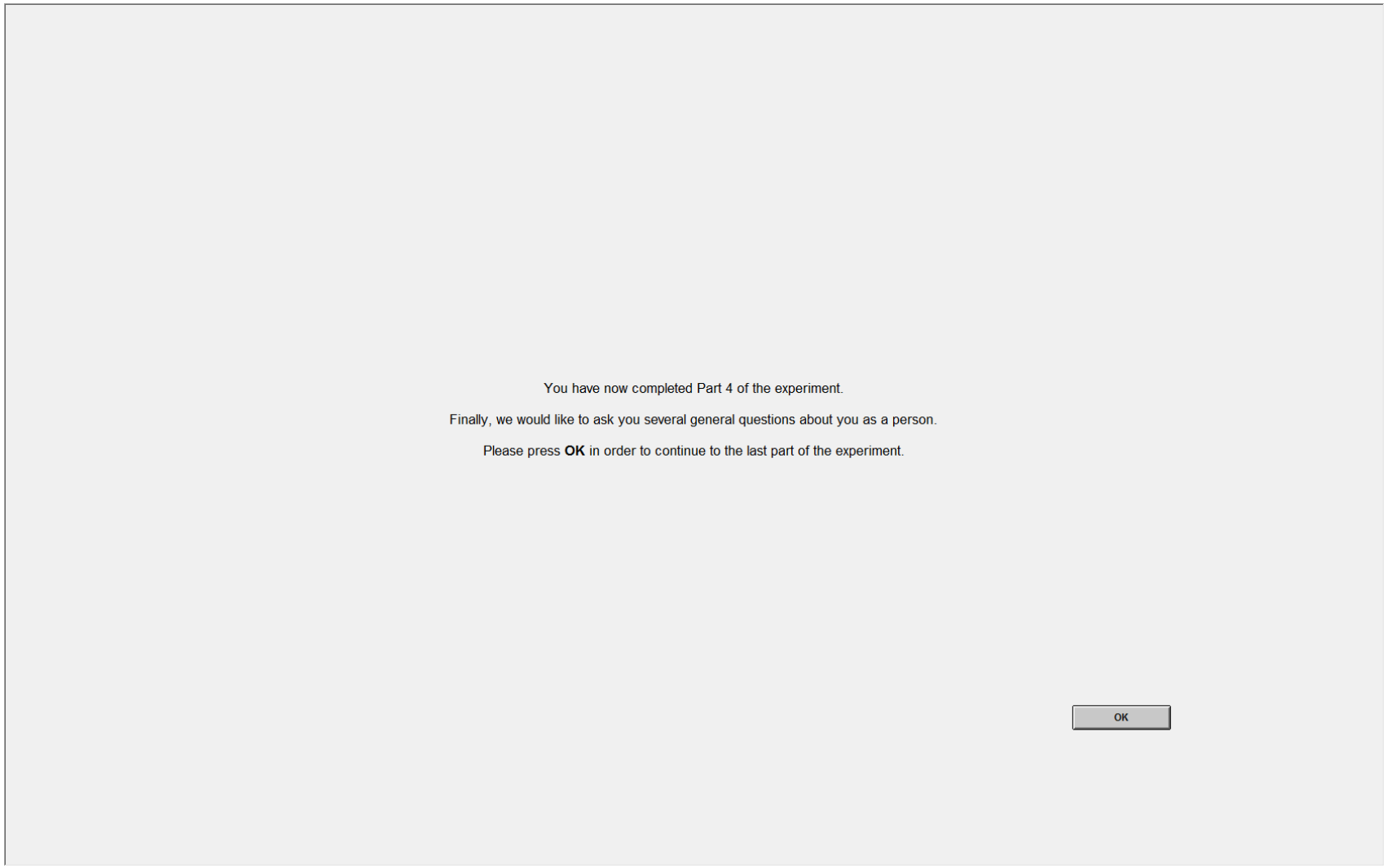

You have been assigned the role of **Participant 1** .
Now please decide how many EUR and CENT (from 0 to 20 EUR) you want to allocate to Participant 2.
Please note: your allocation decision is payoff relevant.
I will allocate to participant 2:
Continue

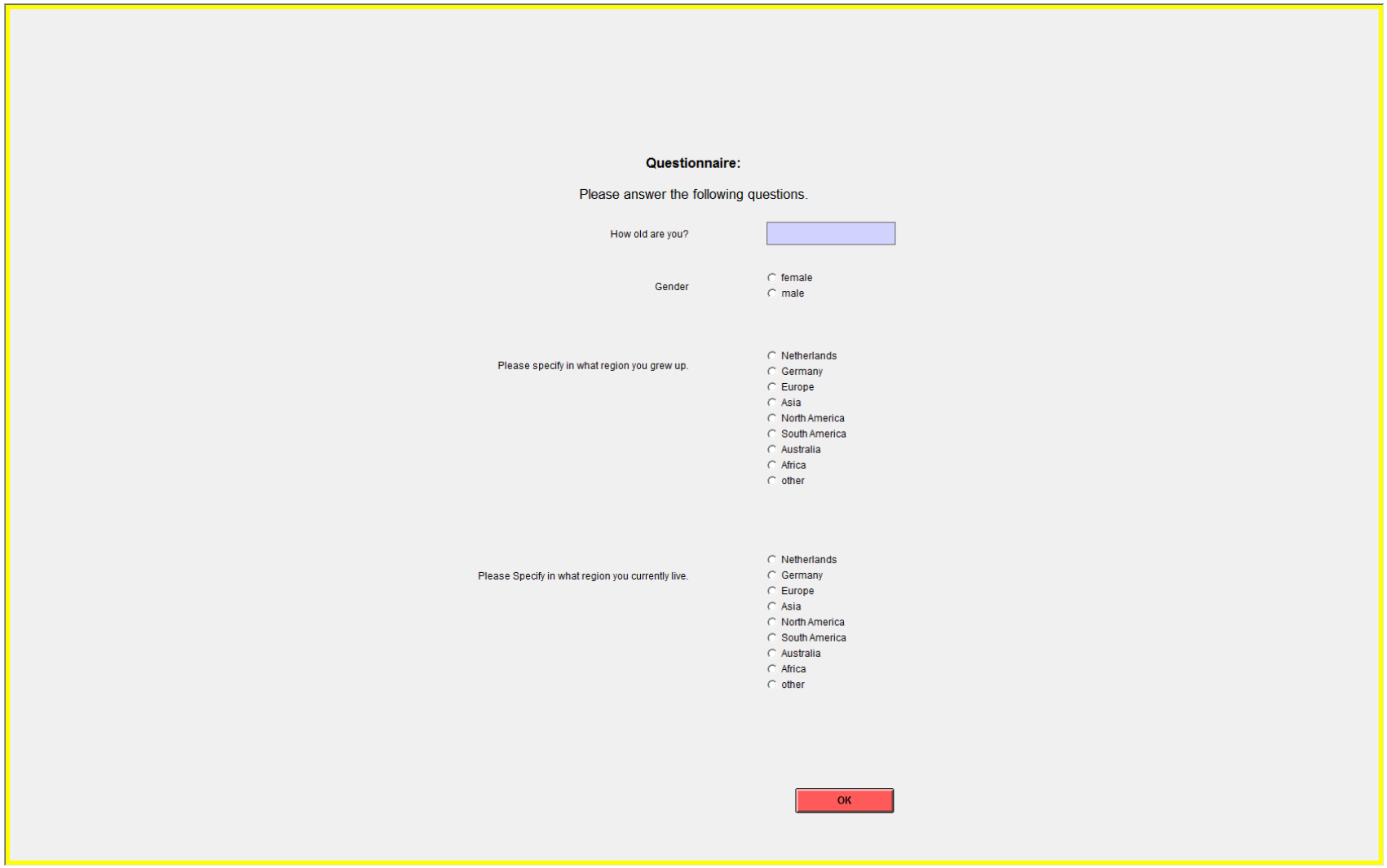
You have been allocated the role of **participant 2** .

Participant 1 has just decided about the money allocation between the two of you.
You will get feedback about the exact money allocation at the end of the experiment.

Please press **OK** to continue.

OK


You have now completed Part 4 of the experiment.
Finally, we would like to ask you several general questions about you as a person.
Please press **OK** in order to continue to the last part of the experiment.
OK


Questionnaire:
Please answer the following questions.
How old are you?
Gender
female
male
Please specify in what region you grew up.
Netherlands
Germany
Europe
Asia
North America
South America
Australia
Africa
other
Please Specify in what region you currently live.
Netherlands
Germany
Europe
Asia
North America
South America
Australia
Africa
other
OK

What is your current (field of) profession?

(Note: multiple answers are possible.)

- ☐ Entrepreneur (as founder or part of the founding team)
- ☐ Provider of start-up finance (VC, Business Angel, Bank, or similar)
- ☐ Academia
- ☐ Politics
- ☐ Law
- ☐ Creative industries/artist
- ☐ Student
- ☐ Other, please specify in the box below.

If you specified yourself in the previous question as an entrepreneur, please answer the following questions. If you are not an entrepreneur, please proceed to the last (bold printed) question on this page.

How many businesses do you currently operate as an entrepreneuer?

Are you working as a part-time or full-time entrepreneur?

- ○ part-time
- ○ full-time

Please indicate as how social** you would describe one or more of your businesses.

1 = I operate a social business ○ ○ ○ ○ ○ ○ ○ 7 = I do not at all consider my business as social

**a social business intends to explore and exploit opportunities to create social value while also pursuing financial goals. This includes any kinds of activities that have a particularly social, environmental, or community objectives.

For how many years have you been working in your current profession or as an entrepreneur? (If you are both, please indicate your years of experimence in entrepreneurship)

OK


On the whole one can trust people.
totally agree
rather agree
rather disagree
totally disagree
Nowadays one can't rely on anyone.
totally agree
rather agree
rather disagree
totally disagree
If one is dealing with strangers, it is better to be careful before one can trust them.
totally agree
rather agree
rather disagree
totally disagree
OK

Please click on the box behind the statement which you believe is more accurate.

Do you believe...

- (•) ... that most people would exploit you if they had the opportunity OR
- ( ) ...would attempt to be fair to you

Would you say that for most of the time...

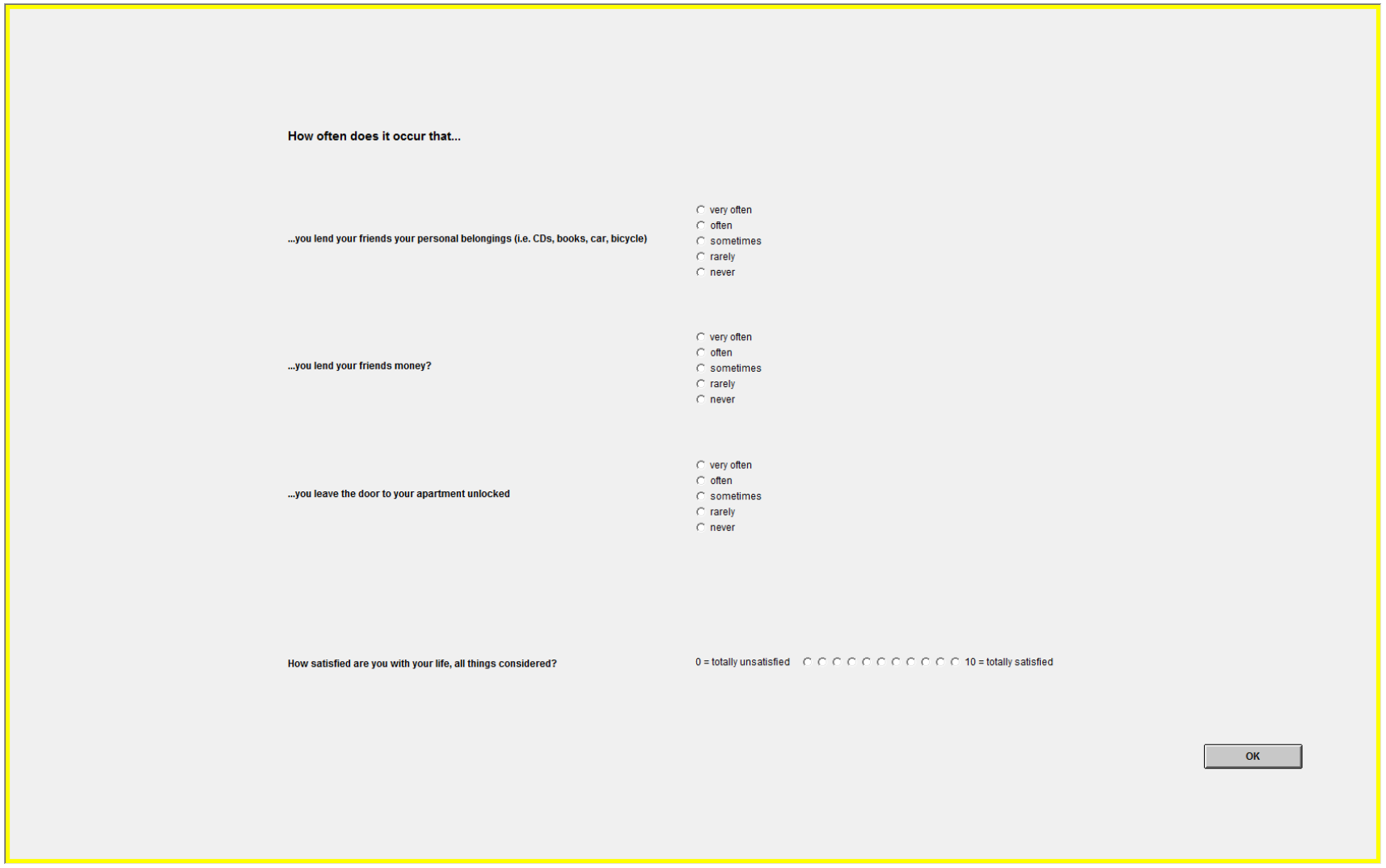
- ( ) ... people attempt to be helpful OR
- (•) ...only act in their own interest

Have you ever profited from the generosity of a person, who you had not previously met?

- ( ) Yes
- ( ) No

What would you say how many close friends do you have?

OK


How often does it occur that...
...you lend your friends your personal belongings (i.e. CDs, books, car, bicycle)
very often
often
sometimes
rarely
never
...you lend your friends money?
very often
often
sometimes
rarely
never
...you leave the door to your apartment unlocked
very often
often
sometimes
rarely
never
How satisfied are you with your life, all things considered?
0 = totally unsatisfied
10 = totally satisfied
OK

We will now briefly describe some people to you. Please indicate for each description whether that person is very much like you, like you, somewhat like you, not like you, or not at all like you.

Looking after the environment is important to this person; to care for nature.	○ ○ ◉ ○ ○ ○
It is important to this person to help the people nearby; to care for their well-being.	○ ○ ○ ○ ○ ○
It is important to this person to always behave properly; to avoid doing anything people would say is wrong.	○ ○ ○ ○ ○ ○
Tradition is important to this person; to follow the customs handed down by one's religion or familiy.	○ ○ ○ ○ ○ ○
Living in secure surroundings is important to this person; to avoid anything that might be dangerous.	○ ○ ○ ○ ○ ○
It is important to this person to be rich; to have a lot of money and expensive things.	○ ○ ○ ○ ○ ○
Being very successful is important to this person; to have people recognize one's achievements.	○ ○ ○ ○ ○ ○
It is important to this person to have a good time; to 'spoil' oneself.	○ ○ ○ ○ ○ ○
Adventure and taking risks are important to this person; to have an exciting life.	○ ○ ○ ○ ○ ○
It is important to this person to think up new ideas and be creative; to do things one's own way.	○ ○ ○ ○ ○ ○

OK

How would you rate yourself in comparison to your peers (e.g. colleagues, associates etc.) on the following measures:

... solve problems?	○	○	◉	○	○
... manage money?	○	○	○	◉	○
... be creative?	○	○	○	◉	○
... get people to agree with you?	○	○	○	○	○
... be a leader?	○	○	○	○	○
... make decisions?	○	○	○	○	○
... successful identify new business opportunities?	○	○	○	○	○
... create new products?	○	○	○	○	○
... think creatively?	○	○	○	○	○
... commercialize an idea or new development?	○	○	○	○	○
... raise funds for a new business?	○	○	○	○	○
... sell a new product or service?	○	○	○	○	○

OK

This is your total profit:

Your profit from the first part in EUR : 15.40

In the lottery row **6** was selected randomly.
In this row you have chosen: Lottery B

Your profit from the second part in EUR : 1.00

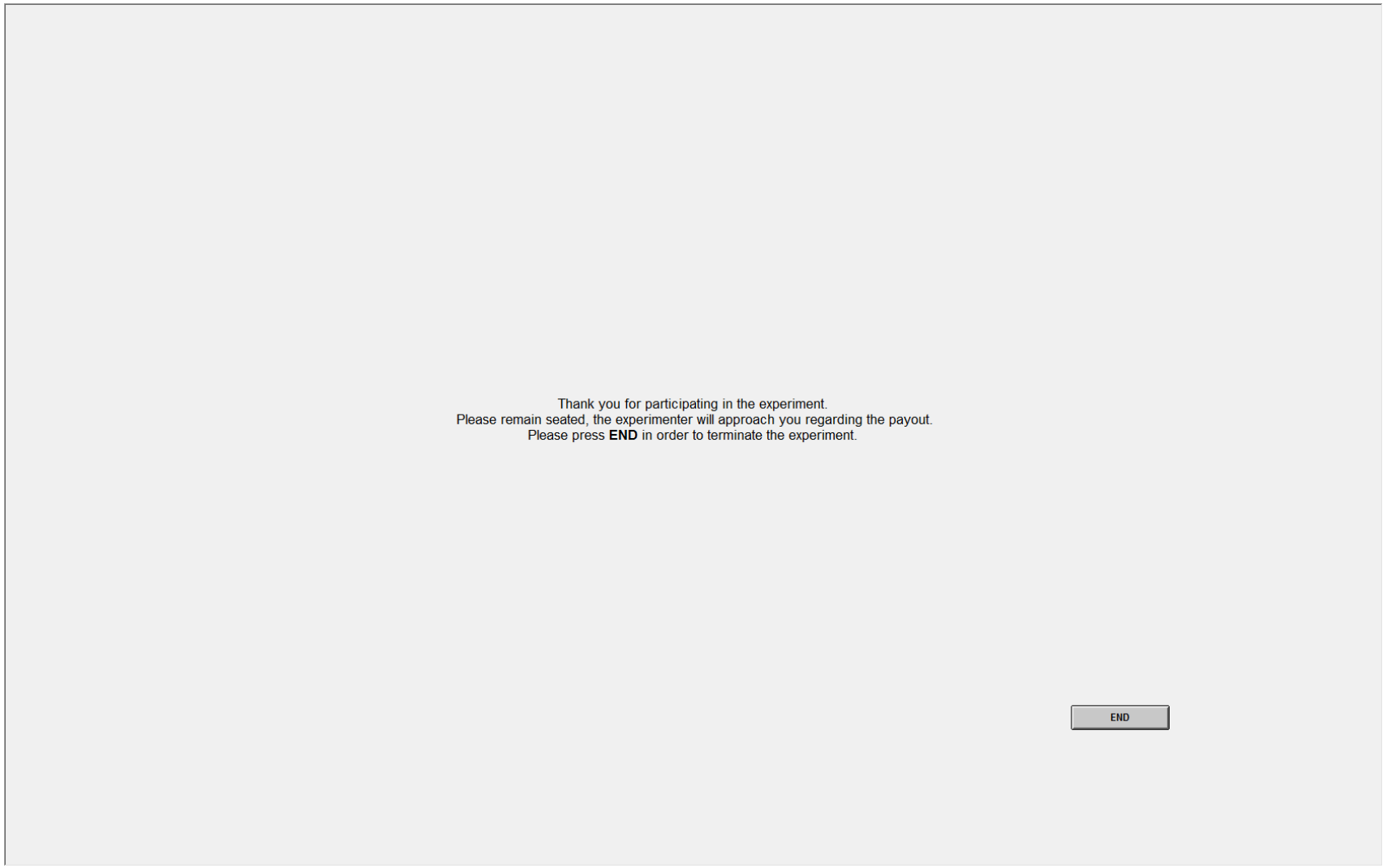
Your profit from the third part in EUR : 20.20

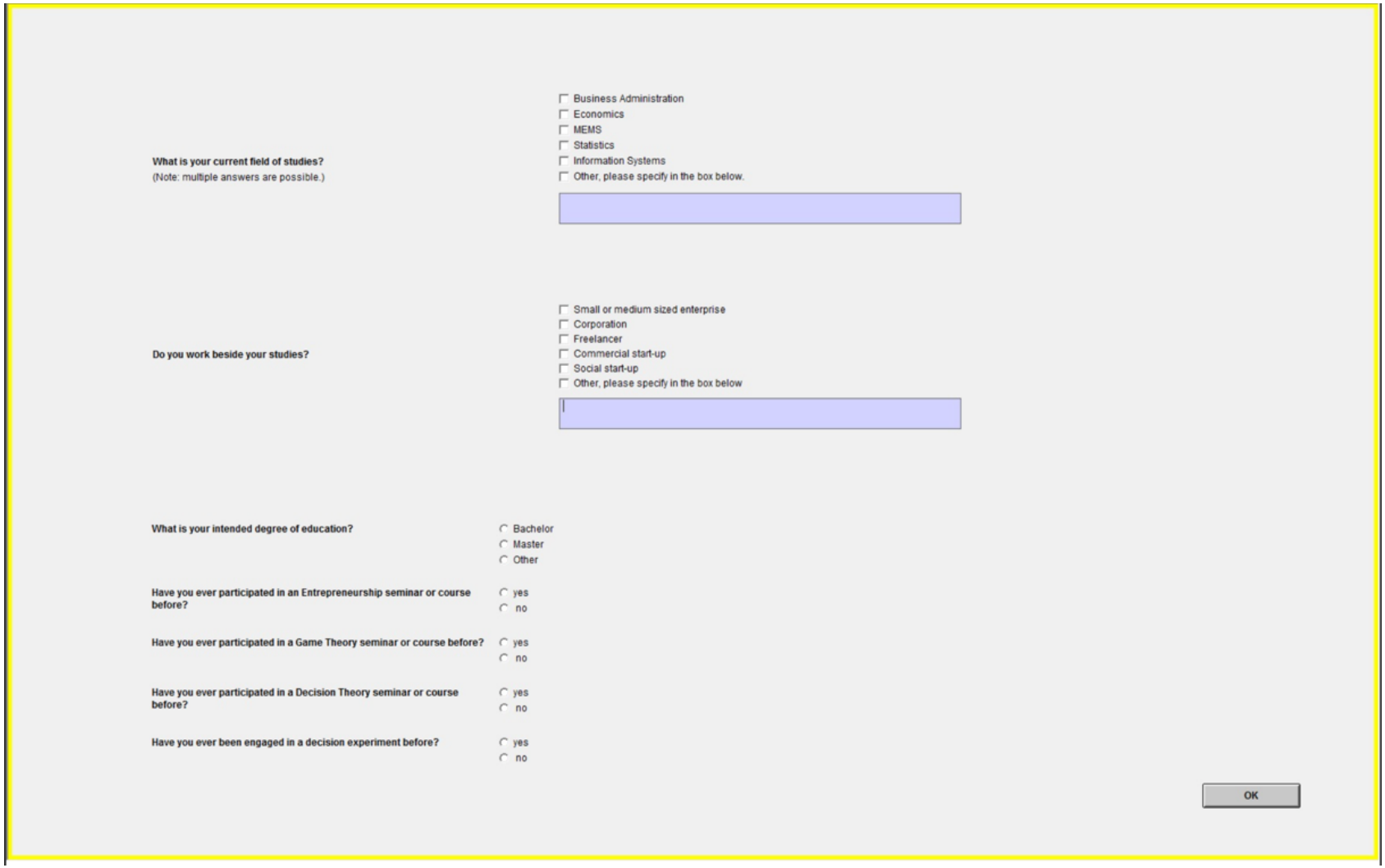
Round 6 was randomly chosen as payout relevant.

Your profit from the fourth part in EUR : 17.00

Your total payoff in EUR : 53.60

OK


Thank you for participating in the experiment.
Please remain seated, the experimenter will approach you regarding the payout.
Please press **END** in order to terminate the experiment.
END


What is your current field of studies?
(Note: multiple answers are possible.)
Business Administration
Economics
MEMS
Statistics
Information Systems
Other, please specify in the box below.
Do you work beside your studies?
Small or medium sized enterprise
Corporation
Freelancer
Commercial start-up
Social start-up
Other, please specify in the box below
What is your intended degree of education?
Bachelor
Master
Other
Have you ever participated in an Entrepreneurship seminar or course before?
yes
no
Have you ever participated in a Game Theory seminar or course before?
yes
no
Have you ever participated in a Decision Theory seminar or course before?
yes
no
Have you ever been engaged in a decision experiment before?
yes
no
OK


Have you founded a business in the past?
yes
no
How interested are you in setting up your own business?
1 = not at all
5 = very interested
How likely is it that you will open up your own business in the near future?
1 = not likely at all
5 = most likely
To what extend have you been preparing to set up your own business?
1 = not at all
5 = very prepared
How likely is it that you will try hard to set up your own business?
1 = not likely at all
5 = very likely
How soon are you likely to set up your own business?
1 = not soon at all
5 = very soon
Would you consider joining a start-up in the near future?
yes
no
If you chose to set up a business, would it be a social or commercial business?
social
commercial
OK

Please answer the following questions as truthful as possible on a nine point scale.

I tend to manipulate others to get my way.	strongly disagree ○ ○ ○ ○ ○ ○ ○ ○ ○ strongly agree
I have used deceit or lied to get my way.	strongly disagree ○ ○ ○ ○ ○ ○ ○ ○ ○ strongly agree
I have use flattery to get my way.	strongly disagree ○ ○ ○ ○ ○ ○ ○ ○ ○ strongly agree
I tend to exploit others towards my own end.	strongly disagree ○ ○ ○ ○ ○ ○ ○ ○ ○ strongly agree
I tend to lack remorse.	strongly disagree ○ ○ ○ ○ ○ ○ ○ ○ ○ strongly agree
I tend to be unconcerned with the morality of my actions.	strongly disagree ○ ○ ○ ○ ○ ○ ○ ○ ○ strongly agree
I tend to be callous or insensitive.	strongly disagree ○ ○ ○ ○ ○ ○ ○ ○ ○ strongly agree
I tend to be cynical.	strongly disagree ○ ○ ○ ○ ○ ○ ○ ○ ○ strongly agree
I tend to want others to admire me.	strongly disagree ○ ○ ○ ○ ○ ○ ○ ○ ○ strongly agree
I tend to want others to pay attention to me.	strongly disagree ○ ○ ○ ○ ○ ○ ○ ○ ○ strongly agree
I tend to seek prestige or status.	strongly disagree ○ ○ ○ ○ ○ ○ ○ ○ ○ strongly agree
I tend to expect special favors from others.	strongly disagree ○ ○ ○ ○ ○ ○ ○ ○ ○ strongly agree

OK

If I were to start a new venture, my motivation for the business would include wanting it to:.

Achieve financial success, even if it is a little destructive to society.	strongly disagree ○ ○ ○ ○ ○ strongly agree
Maximize profits, even at the cost of employees' well-beeing.	strongly disagree ○ ○ ○ ○ ○ strongly agree
Grow quickly, even if that means sacrificing quality.	strongly disagree ○ ○ ○ ○ ○ strongly agree
Earn a financial profit at all costs.	strongly disagree ○ ○ ○ ○ ○ strongly agree
Outsource work to reduce costs as much as possible.	strongly disagree ○ ○ ○ ○ ○ strongly agree
Generate value for society.	strongly disagree ○ ○ ○ ○ ○ strongly agree
Produce products/services that enrich the lives of people.	strongly disagree ○ ○ ○ ○ ○ strongly agree
Develop a culture in which its employees value their work.	strongly disagree ○ ○ ○ ○ ○ strongly agree
Be admired or the value that it adds to the community.	strongly disagree ○ ○ ○ ○ ○ strongly agree
Attract employees who value the mission of the company as though it were their own.	strongly disagree ○ ○ ○ ○ ○ strongly agree

OK


On the whole one can trust people.
totally agree
rather agree
rather disagree
totally disagree
Nowadays one can't rely on anyone.
totally agree
rather agree
rather disagree
totally disagree
If one is dealing with strangers, it is better to be careful before one can trust them.
totally agree
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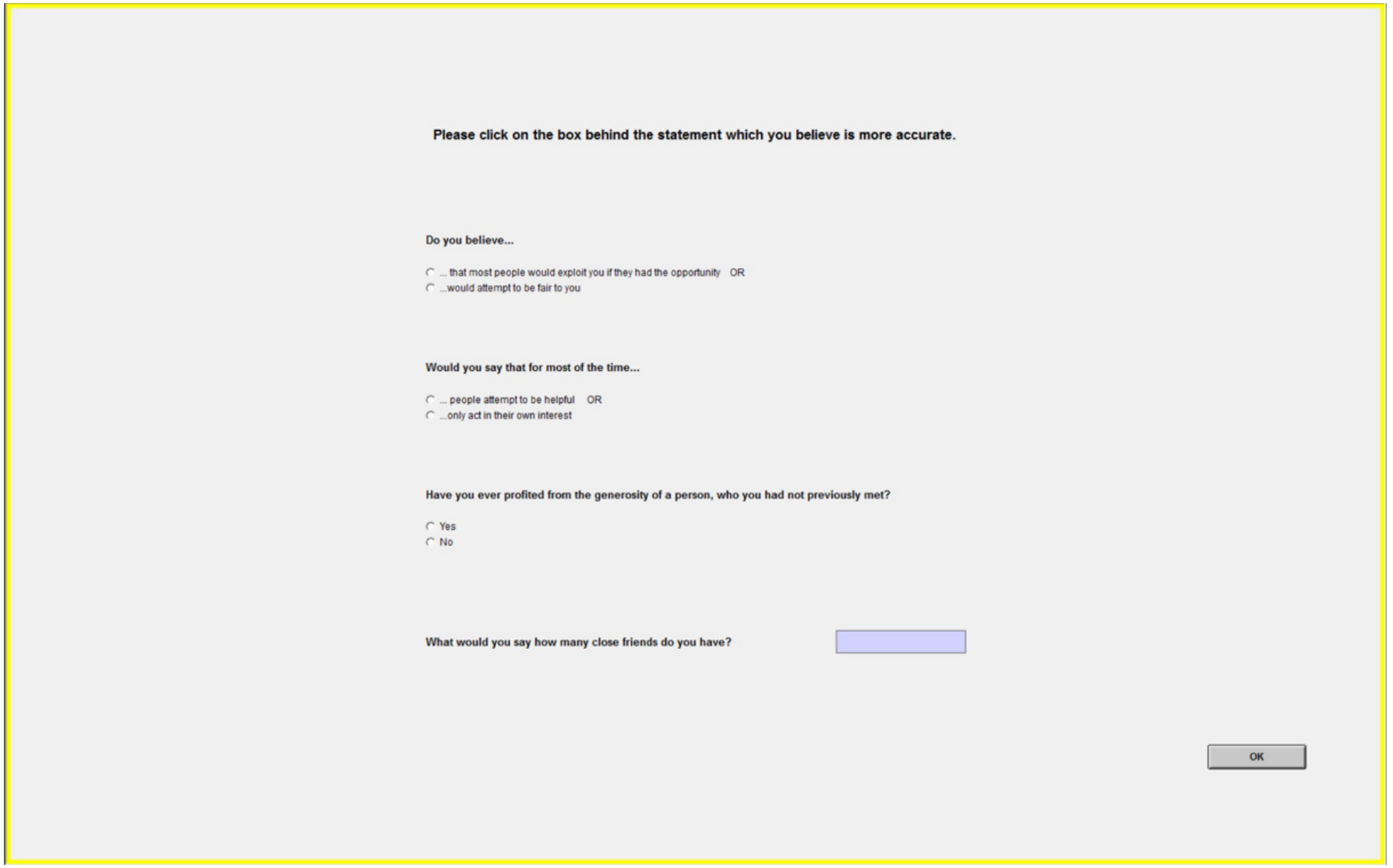
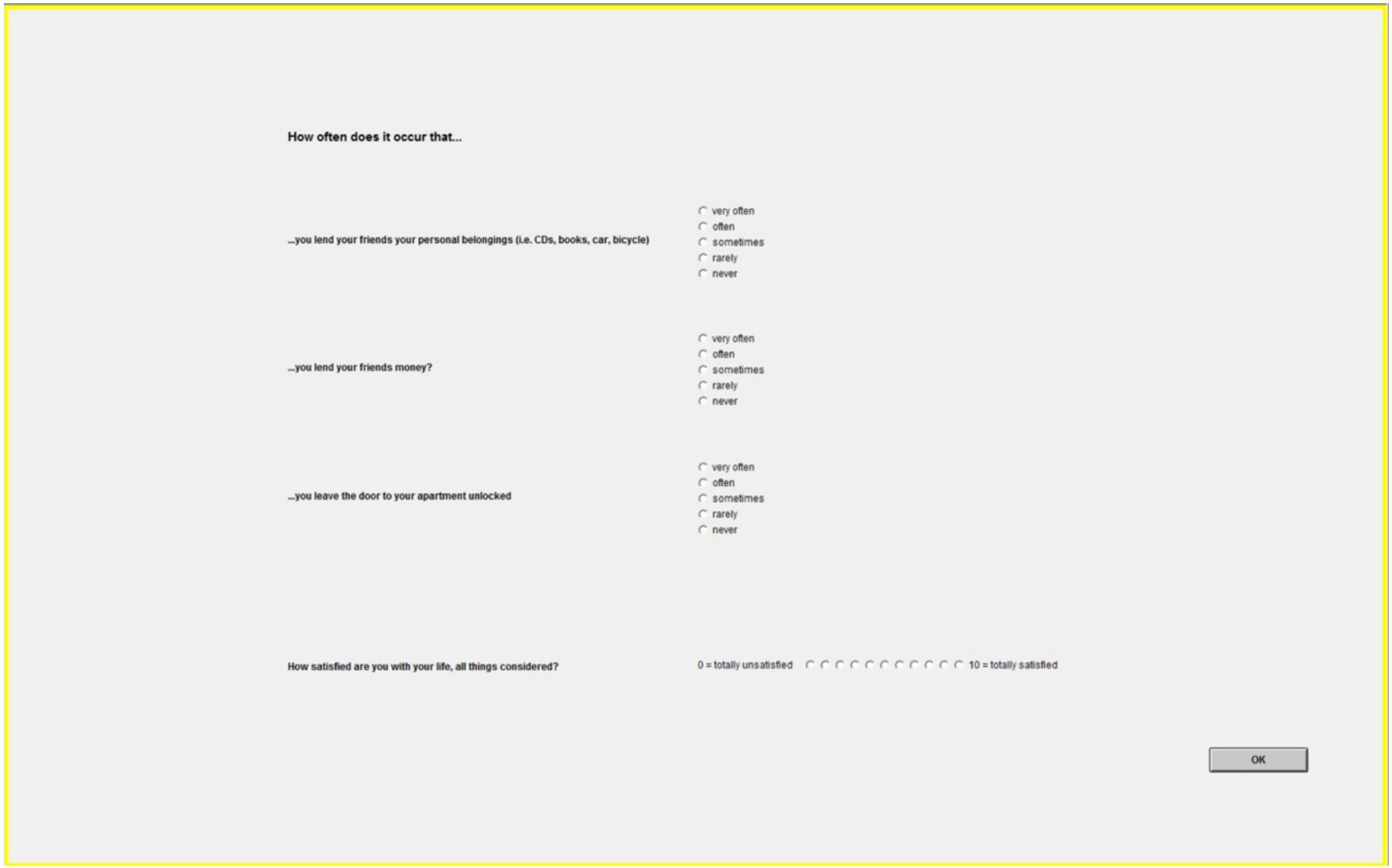
totally disagree
OK

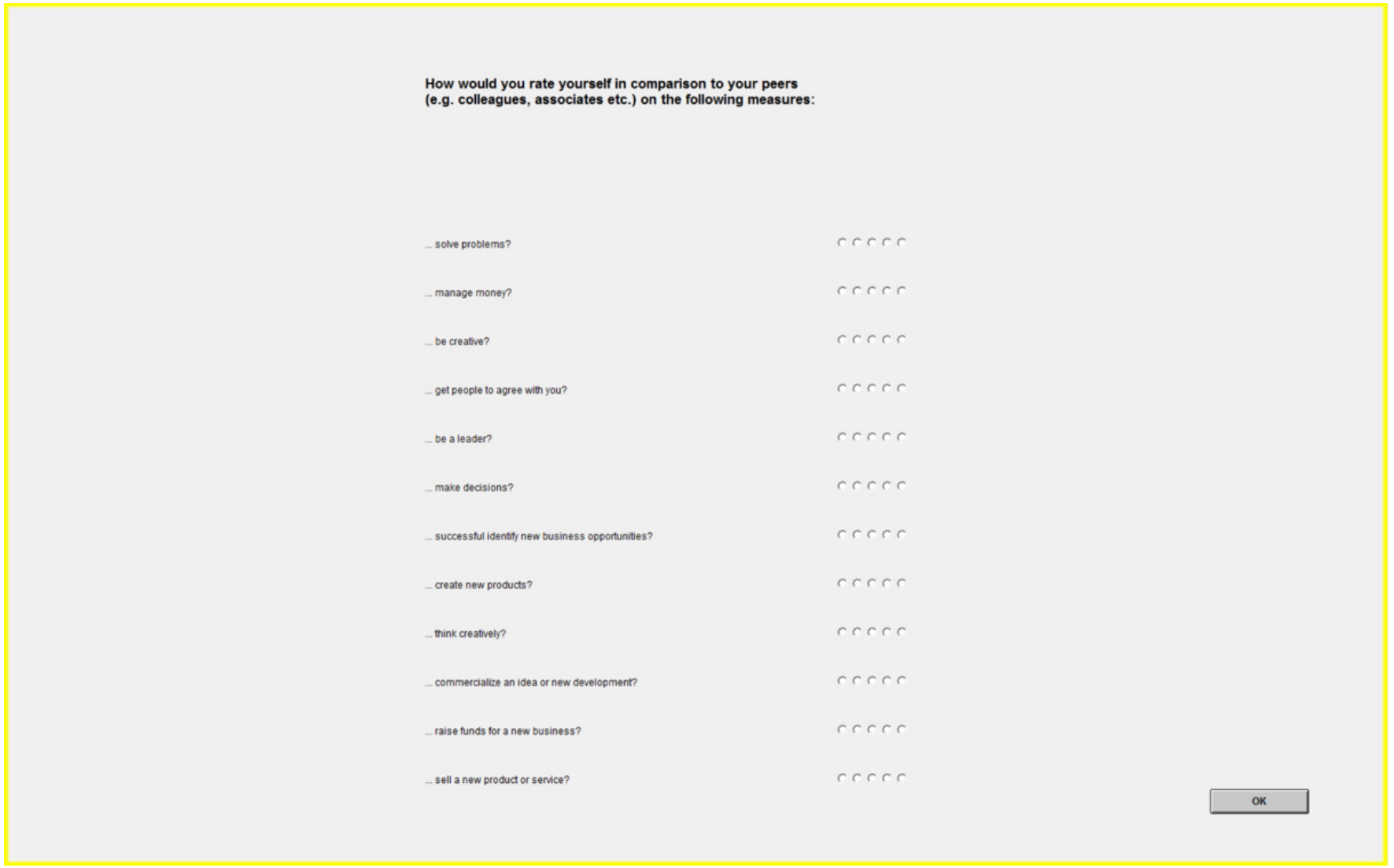

Please click on the box behind the statement which you believe is more accurate.
Do you believe...
... that most people would exploit you if they had the opportunity OR
...would attempt to be fair to you
Would you say that for most of the time...
... people attempt to be helpful OR
...only act in their own interest
Have you ever profited from the generosity of a person, who you had not previously met?
Yes
No
What would you say how many close friends do you have?
OK


How often does it occur that...
...you lend your friends your personal belongings (i.e. CDs, books, car, bicycle)
very often
often
sometimes
rarely
never
...you lend your friends money?
very often
often
sometimes
rarely
never
...you leave the door to your apartment unlocked
very often
often
sometimes
rarely
never
How satisfied are you with your life, all things considered?
0 = totally unsatisfied
10 = totally satisfied
OK

We will now briefly describe some people to you. Please indicate for each description whether that person is very much like you, like you, somewhat like you, not like you, or not at all like you.

Looking after the environment is important to this person; to care for nature.	○ ○ ○ ○ ○ ○
It is important to this person to help the people nearby; to care for their well-being.	○ ○ ○ ○ ○ ○
It is important to this person to always behave properly; to avoid doing anything people would say is wrong.	○ ○ ○ ○ ○ ○
Tradition is important to this person; to follow the customs handed down by one's religion or familiy.	○ ○ ○ ○ ○ ○
Living in secure surroundings is important to this person; to avoid anything that might be dangerous.	○ ○ ○ ○ ○ ○
It is important to this person to be rich; to have a lot of money and expensive things.	○ ○ ○ ○ ○ ○
Being very successful is important to this person; to have people recognize one's achievements.	○ ○ ○ ○ ○ ○
It is important to this person to have a good time; to 'spoil' oneself.	○ ○ ○ ○ ○ ○
Adventure and taking risks are important to this person; to have an exciting life.	○ ○ ○ ○ ○ ○
It is important to this person to think up new ideas and be creative; to do things one's own way.	○ ○ ○ ○ ○ ○

OK


How would you rate yourself in comparison to your peers
(e.g. colleagues, associates etc.) on the following measures:
... solve problems?
... manage money?
... be creative?
... get people to agree with you?
... be a leader?
... make decisions?
... successful identify new business opportunities?
... create new products?
... think creatively?
... commercialize an idea or new development?
... raise funds for a new business?
... sell a new product or service?
OK

6.4. Additional Material Essay No. 4

Additional analysis output

Table A XXII: Regression (un)productive entrepreneurial motives - all subjects

	Productive entrepreneurial motives	Unproductive entrepreneurial motives
Variable	Full Model	Full Model
Control variables		
Male	-0.0396	-0.106
	(0.145)	(0.115)
Age	0.189	-0.0344
	(0.134)	(0.106)
Happiness	0.0356	0.0694
	(0.138)	(0.110)
Main effects		
Psychopathy	-0.0958	0.382***
	(0.164)	(0.131)
Machiavellianism	0.0156	0.00218
	(0.153)	(0.122)
Narcissism	0.216	0.519***
	(0.137)	(0.109)
Observations	62	62
F-Ratio	0.73	6.49
R squared	0.0739	0.4143

Standard errors in parentheses.

*p<0.1;**<0.05;***p<0.01;

Table A XXIII: Variables' means split by entrepreneurial intentions

Variable	High entrepreneurial intentions		Low entrepreneurial Intentions	
	N=32		N=30	
	Mean	S.D.	Mean	S.D.
Dark Triad				
Psychopathy	2,70	1,20	3,58	1,32
Narcissism	4,80	1,92	4,55	1,91
Machiavellianism	3,34	1,59	3,19	1,45
Entrepreneurial Goals				
Unproductive Goals	2,16	0,86	2,33	0,76
Productive Goals	4,15	0,65	4,01	0,56
Social Preferences				
Altruism	1,14	1,03	0,96	1,25
Cooperation	2,58	1,79	2,85	1,91

Experimental Design Screenshots


What is your current field of studies?
(Note: multiple answers are possible.)
Business Administration
Economics
MEMS
Statistics
Information Systems
Other, please specify in the box below.
Do you work beside your studies?
Small or medium sized enterprise
Corporation
Freelancer
Commercial start-up
Social start-up
Other, please specify in the box below
What is your intended degree of education?
Bachelor
Master
Other
Have you ever participated in an Entrepreneurship seminar or course before?
yes
no
Have you ever participated in a Game Theory seminar or course before?
yes
no
Have you ever participated in a Decision Theory seminar or course before?
yes
no
Have you ever been engaged in a decision experiment before?
yes
no
OK


Have you founded a business in the past?
yes
no
How interested are you in setting up your own business?
1 = not at all
5 = very interested
How likely is it that you will open up your own business in the near future?
1 = not likely at all
5 = most likely
To what extend have you been preparing to set up your own business?
1 = not at all
5 = very prepared
How likely is it that you will try hard to set up your own business?
1 = not likely at all
5 = very likely
How soon are you likely to set up your own business?
1 = not soon at all
5 = very soon
Would you consider joining a start-up in the near future?
yes
no
If you chose to set up a business, would it be a social or commercial business?
social
commercial
OK

Please answer the following questions as truthful as possible on a nine point scale.

I tend to manipulate others to get my way.	strongly disagree ○ ○ ○ ○ ○ ○ ○ ○ ○ strongly agree
I have used deceit or lied to get my way.	strongly disagree ○ ○ ○ ○ ○ ○ ○ ○ ○ strongly agree
I have use flattery to get my way.	strongly disagree ○ ○ ○ ○ ○ ○ ○ ○ ○ strongly agree
I tend to exploit others towards my own end.	strongly disagree ○ ○ ○ ○ ○ ○ ○ ○ ○ strongly agree
I tend to lack remorse.	strongly disagree ○ ○ ○ ○ ○ ○ ○ ○ ○ strongly agree
I tend to be unconcerned with the morality of my actions.	strongly disagree ○ ○ ○ ○ ○ ○ ○ ○ ○ strongly agree
I tend to be callous or insensitive.	strongly disagree ○ ○ ○ ○ ○ ○ ○ ○ ○ strongly agree
I tend to be cynical.	strongly disagree ○ ○ ○ ○ ○ ○ ○ ○ ○ strongly agree
I tend to want others to admire me.	strongly disagree ○ ○ ○ ○ ○ ○ ○ ○ ○ strongly agree
I tend to want others to pay attention to me.	strongly disagree ○ ○ ○ ○ ○ ○ ○ ○ ○ strongly agree
I tend to seek prestige or status.	strongly disagree ○ ○ ○ ○ ○ ○ ○ ○ ○ strongly agree
I tend to expect special favors from others.	strongly disagree ○ ○ ○ ○ ○ ○ ○ ○ ○ strongly agree

OK

If I were to start a new venture, my motivation for the business would include wanting it to:.

Achieve financial success, even if it is a little destructive to society.	strongly disagree ○ ○ ○ ○ ○ strongly agree
Maximize profits, even at the cost of employees' well-beeing.	strongly disagree ○ ○ ○ ○ ○ strongly agree
Grow quickly, even if that means sacrificing quality.	strongly disagree ○ ○ ○ ○ ○ strongly agree
Earn a financial profit at all costs.	strongly disagree ○ ○ ○ ○ ○ strongly agree
Outsource work to reduce costs as much as possible.	strongly disagree ○ ○ ○ ○ ○ strongly agree
Generate value for society.	strongly disagree ○ ○ ○ ○ ○ strongly agree
Produce products/services that enrich the lives of people.	strongly disagree ○ ○ ○ ○ ○ strongly agree
Develop a culture in which its employees value their work.	strongly disagree ○ ○ ○ ○ ○ strongly agree
Be admired or the value that it adds to the community.	strongly disagree ○ ○ ○ ○ ○ strongly agree
Attract employees who value the mission of the company as though it were their own.	strongly disagree ○ ○ ○ ○ ○ strongly agree

OK

On the whole one can trust people.

- totally agree
- rather agree
- rather disagree
- totally disagree

Nowadays one can't rely on anyone.

- totally agree
- rather agree
- rather disagree
- totally disagree

If one is dealing with strangers, it is better to be careful before one can trust them.

- totally agree
- rather agree
- rather disagree
- totally disagree

OK

Please click on the box behind the statement which you believe is more accurate.

Do you believe...

- ○ ... that most people would exploit you if they had the opportunity OR
- ○ ...would attempt to be fair to you

Would you say that for most of the time...

- ○ ... people attempt to be helpful OR
- ○ ...only act in their own interest

Have you ever profited from the generosity of a person, who you had not previously met?

- ○ Yes
- ○ No

What would you say how many close friends do you have?

OK

How often does it occur that...

...you lend your friends your personal belongings (i.e. CDs, books, car, bicycle)

- very often
- often
- sometimes
- rarely
- never

...you lend your friends money?

- very often
- often
- sometimes
- rarely
- never

...you leave the door to your apartment unlocked

- very often
- often
- sometimes
- rarely
- never

How satisfied are you with your life, all things considered?

0 = totally unsatisfied ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ 10 = totally satisfied

OK

We will now briefly describe some people to you. Please indicate for each description whether that person is very much like you, like you, somewhat like you, not like you, or not at all like you.

Looking after the environment is important to this person; to care for nature.	○ ○ ○ ○ ○ ○
It is important to this person to help the people nearby; to care for their well-being.	○ ○ ○ ○ ○ ○
It is important to this person to always behave properly; to avoid doing anything people would say is wrong.	○ ○ ○ ○ ○ ○
Tradition is important to this person; to follow the customs handed down by one's religion or familiy.	○ ○ ○ ○ ○ ○
Living in secure surroundings is important to this person; to avoid anything that might be dangerous.	○ ○ ○ ○ ○ ○
It is important to this person to be rich; to have a lot of money and expensive things.	○ ○ ○ ○ ○ ○
Being very successful is important to this person; to have people recognize one's achievements.	○ ○ ○ ○ ○ ○
It is important to this person to have a good time; to 'spoil' oneself.	○ ○ ○ ○ ○ ○
Adventure and taking risks are important to this person; to have an exciting life.	○ ○ ○ ○ ○ ○
It is important to this person to think up new ideas and be creative; to do things one's own way.	○ ○ ○ ○ ○ ○

OK

How would you rate yourself in comparison to your peers (e.g. colleagues, associates etc.) on the following measures:

... solve problems?	○ ○ ○ ○ ○
... manage money?	○ ○ ○ ○ ○
... be creative?	○ ○ ○ ○ ○
... get people to agree with you?	○ ○ ○ ○ ○
... be a leader?	○ ○ ○ ○ ○
... make decisions?	○ ○ ○ ○ ○
... successful identify new business opportunities?	○ ○ ○ ○ ○
... create new products?	○ ○ ○ ○ ○
... think creatively?	○ ○ ○ ○ ○
... commercialize an idea or new development?	○ ○ ○ ○ ○
... raise funds for a new business?	○ ○ ○ ○ ○
... sell a new product or service?	○ ○ ○ ○ ○

OK

Eidesstattliche Erklärung

Hiermit versichere ich, dass ich die vorliegende Arbeit ohne fremde Hilfe selbstständig verfasst und nur die aufgeführten Quellen und Hilfsmittel benutzt habe. Die Arbeit wurde bisher in gleicher oder ähnlicher Form keiner anderen Prüfungsbehörde vorgelegt. Ich habe mich bisher keinem anderen Doktorexamen unterzogen.

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Christine Lauritzen
Berlin, 8. Dezember 2020